



UK Engagement with Space Committee

Uncorrected oral evidence: The UK's engagement with space

Monday 23 June 2025

4.50 pm

Watch the meeting

Members present: Baroness Ashton of Upholland (The Chair); Lord Booth-Smith; Lord Clement-Jones; Baroness Donaghy; Baroness Mobarik; Lord Shamash; Lord St John of Bletso; Viscount Stansgate; Baroness Stowell of Beeston; Lord Tarassenko.

Evidence Session No. 20

Heard in Public

Questions 172 – 178

Witnesses

I: Phil Chambers, CEO, Orbex; Dr Martin Heywood, Director, Newton Launch Systems; Stuart Fyvie, Director, Fire Arrow and Independent Adviser, the space industry.

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Examination of witnesses

Phil Chambers, Dr Martin Heywood and Stuart Fyvie.

The Chair: I welcome our second panel for this afternoon's session, where we are going to look at the whole question of what we have learned to call launch and what that means for the UK. I am delighted that we have three extremely important people with us: Phil Chambers, the CEO at Orbex; Dr Martin Hayward, the director at Newton Launch Systems; and Stuart Fyvie, the director at Fire Arrow and an independent adviser to the space industry. You will be able to say a little more about yourselves at the end of the first question. I shall ask Viscount Stansgate to ask the first question and get us rolling.

Q173 **Viscount Stansgate:** I have two questions. First, what is the case for the UK developing its own sovereign launch capability?

Dr Martin Heywood: If the UK is serious about launching its own satellites, which it seems to be now, as there are a lot of development satellites in this country, you need a reliable launcher. We know that space and satellites are going to play quite an important role going forward, in terms of civilian applications and military and security. From a reliability point of view, there is nothing more reliable than having your own capability. We have suffered from this in the past. If we go back to the 1970s, when Britain lost its Black Arrow programme, we were promised low-cost launches from America. I do not know what happened, but it did not materialise. I think we got one launch out of it, and we were left out in the cold a little bit. To wind the clock forward to when I was doing my first study into this in 2012, one of our members on our team was from Surrey Satellites, and he was saying how it was having to launch from Russia, relying on the Russians. That was very unreliable because, if a Russian satellite came along, the British one got bumped down the line. Of course, we now know that with geopolitics Russia is out of the question anyway.

Then most recently, a lot of money was invested in Virgin Orbit. There was a launch, a commercial entity that the Government had no real control over; it went broke and with it went our capability. So if you want a reliable system that you can rely on at fairly short notice if you need it, it needs to be our sovereign capability. The big question is what we actually mean by that. Do we mean British-owned, do we mean launching from the UK, or British Government controlled? There is a bit of flexibility within that, but there is certainly merit in something that we can stamp a British flag on.

Phil Chambers: Britain should absolutely have its own sovereign launch capability. You can split the argument into a few different aspects. The first one is economic. This is a very fast-growing market. The Government say that they need growth. The global space market is forecast to grow from \$45 billion in 2022 to \$63 billion by 2030, and the launch market from \$11 billion in 2022 to \$15 billion by 2030. This is a supply-constrained market. If you want to launch a satellite today, you

have to sign up with SpaceX and wait almost two years to get it into space. Launch demand is up 4x since 2017. There are just not enough launchers. The UK is already benefiting; Orbex's pipeline is up 13x in the last 18 months.

There is also a big geopolitical shift happening in Europe now, because the European Launcher Challenge is somewhat designed to break the Arianespace monopoly. You referenced Black Arrow. The UK used to have the first stage of Ariane 1: the Europa rocket. We decided not to participate in that programme, and tens of thousands of jobs went across to France and Germany, and it was an amazing experience. But there is now a generational opportunity to get back into the launch market. Of course, you have to remember there is a big export upside too. Some 70% of our pipeline is international, with people bringing satellites to the UK to launch them, and we are the only UK company with an EU-ESA launch contract.

The other thing to think about is the jobs aspect. These are very high-skilled, quality jobs. The average salary in Orbex, for instance, is £68,000 a year, which is 2.4 times higher than the national median. If you look at Morayshire, these jobs are on the north coast of Scotland, so they are in a place where historically there have not been that many high-quality jobs. We have over 170 people working there, and plan to hire 300 more.

The final point comes to the geopolitical aspect. Space is now really seen as the fifth domain. In modern conflict, particularly in the Ukraine, we are seeing drone wars. Drones require access to high-quality space-based reconnaissance and space-based communication. To get that, you need to be able to put satellites into space, and you cannot be waiting two years to be able to do that. So it is extremely important that we have our own capability and that we can offer it to our European partners and our partners in NATO via initiatives such as STARLIFT and provide assured launch to our allies.

For all those reasons, it is a very good idea for us to have a sovereign launch capability. As we look forward, there are many more aspects when we look at space-based solar power, space-based manufacturing and space-based data centres. These applications are not yet in production and people are not using them, but if we do not develop sovereign launch capability for small satellites now, we will not be able to do it for larger and more complex applications in future.

Stuart Fyvie: A lot of really good points were made by my colleagues, which covered a lot of ground, but I shall just focus on a couple of them: the global launch value and the market estimate. The global market for space is estimated by the World Economic Forum to be \$1.8 trillion by 2045, but these numbers vary depending on who you speak to. Phil talked about the size of the launch market, but the demand for launch is already outstripping supply; Phil talked about the kind of bottleneck at Cape Canaveral. NovaSpace is predicting 1,700 satellites to be launched per year over the next decade. Some forecasters are putting that up to 3,700 per year. So there is a global demand that needs to be met, and

the UK spaceports are well-placed to provide that commercial and attractive alternative to the US.

My area of core interest is the economic impact that the space sector has on communities. Phil mentioned the high-skilled jobs. Later on in the committee, I think the conversation will focus on what that means to the community. We have a lot of information here, but we are looking at the halo effect when these launch campaigns take place. For example, on the north coast of Scotland, 20 to 30 people come into the area for four to six weeks to prosecute a launch campaign. All those people need to be fed, watered, accommodated and entertained, and they need transport. The amount of people you will see in these areas, if it is 20 to 30 per launch campaign and there are 10 to 12 launch campaigns per year, is over 300 people. The population in the area will be lifted by 6% in the area of Sutherland, believe it or not. If you are able to realise the potential for Sutherland, for example, as SaxaVord has achieved in Shetland with multiple launch pads, you can do the maths and you can see how the halo effect of the launch operations can impact that community.

In terms of innovation and skills, launch enables universities, research bodies and start-ups to test and deploy technology from UK soil, which accelerates R&D and encourages STEM participation, and launch capability increases the UK's influence in international space governance and commercial partnerships. For the UK, it also provides that cradle-to-grave service, whereby the UK punches well above its weight in the world in terms of satellite manufacture, and those UK and European satellite manufacturing companies can launch local. So the logistics are simplified, and there is less risk of damage to the payloads, and so on. It is a logistically preferred option to having to transport those payloads overseas.

Q174 Viscount Stansgate: I expect shorter answers to my second question because it is this: what is the case against the UK developing solar launch capability?

Dr Martin Heywood: There is the business case. I know that there will be a question later on about how the global market translates to the UK, but it is a challenge. Those challenges are the costs involved in developing a launcher, the cost of operating it, and the limitations that we have in the UK if we are launching from the UK. We are not a good location to launch from. We are limited really to polar or sun-synchronous orbit, which is a fraction of the global market. We are limited in size with the spaceports we have at the moment to a small satellite launch, which is up to about a 500 kilogram payload.

A lot of the growth is in other areas, such as in satellite constellations. I have looked at the figures for last year, and over 2,800 satellites were launched globally. It may be that some were supply constrained, but 2,200 of those were in America and 1,300 were Starlink. When you look at that, you realise that, although there is quite a distortion in the market, there is a lot of the market that we cannot access in this country—so it remains to be seen. There is a case for a UK launcher

commercially, but I do not see us having multiple launches for multiple launch sites. The north coast of Scotland is not going to resemble Florida in 10 years; it will be far from it.

Viscount Stansgate: Is there anything that either of the other panel members wants to add?

Phil Chambers: The case against means, effectively, looking at the technological risk and the amount of time and money that it takes to develop these products and this infrastructure. Of course, that is applicable to any ground-breaking technology. Space is hard, but ultimately the rewards, economically with jobs and access to a new domain, are big and worth having. I refer back to my previous answer: perhaps Martin is right and we will not be launching super-heavy rockets in northern Scotland, but the UK has other territory where it could launch from. Ascension Island is actually the perfect equatorial launch site. It has great weather, is very close to the equator, has a long runway and a radar station and is in the middle of nowhere. It is in many ways better than French Guiana. So there are places that the UK could develop to build a bigger sovereign capability.

Stuart Fyvie: There are barriers and limitations to launch in the UK. As part of my business, we speak to launch operators in South America, the US, the Middle East and the Far East, and to spaceports. We are hearing that they view the UK as a very attractive alternative location to launch. We are limited to polar and sun-sync orbits, but there is a massive market, for it because it is great for earth observation. But we are hearing slightly different messages. I met with the CEO of an international spaceport last week, and they basically reflected on the benefits of coming to the UK to partner on interoperability. They see it as a really attractive place to do launch. Technically, you have access to the orbits from the north coast of Scotland, the mainland and the Shetlands.

On barriers to launch there is clearly funding, with government-backed payloads and government-backed customers to generate that confidence in supply. A previous speaker mentioned that in terms of procurement with the Government. If we want launch to be successful, we need to generate the business case and start ordering from the UK and European launch sector to operate from the UK. In terms of the case against launch, there are limitations, but we hear from international peers that it is a preferred place to do business in Europe for launch.

Q175 **Baroness Stowell of Beeston:** You started to touch on this a little, but I am keen to get into more about where the UK fits into this global market for launch. What is your sense of the size of the UK's part of the global market and what is the bit of the market that you think we are best placed to capture? I shall start with Dr Heywood.

Dr Martin Heywood: As we have said, we are limited at the moment if we are looking at launch from the UK to satellites flying into sun-synchronous or polar orbit: satellites that are earth observation mainly, maybe some technology demonstration, that type of thing. We are also

limited to fairly small satellites, which have the problem that you can launch a small satellite far more cheaply on a large rocket than you can on a small one. There is competition straightaway from SpaceX with the Falcon 9 that can launch multiple rockets of, say, 250 kilogram payload, whereas a rocket launched from Scotland would only be able to launch one of them there.

Baroness Stowell of Beeston: Sorry, just say that last bit again.

Dr Martin Heywood: A rocket from Scotland with a capability of 250 kilogram payload can only launch one satellite; you can launch multiple ones on an American rocket for a fraction of the price. We are looking at the fact that it has to be something launched into sun-synchronous or polar orbit, it has to be relatively small, and then something where you have a real need to launch on a small launcher. For example, why would you take a taxi rather than a bus? Well, you do not want to share with somebody else, you want to go somewhere specific where the bus does not run, or you want to go at a certain time when the bus does not run. There will be needs—and defence is a very obvious example—where the Government want to launch something on a certain date to a certain place and are not going to wait two years for SpaceX. There will be others, such as a university with a little research rocket, which is far more attracted by knocking a zero off the price, as would happen if you went to America, than launching from this country. We will not be competing on price; it will be a specialist niche market.

On the numbers—and this is about where we are now and not where we might want to go, although I am sure my two colleagues will have an opinion on where we might be going—I had a look at the figures from last year for what was launched. This is not about the country of origin of satellites but where the launch took place. We know that most satellites launched in America were built there, because they were Starlink. It was quite staggering to see the dominance that America has at the moment. Excluding America, China, and Russia—three countries that have their own launch capability—out of the 2,858, the rest of the world launched 129 satellites, which is 4.5%. When you look at it by payload mass, it was down to 3.7% because a lot of the satellites launched in India and Japan for example, were smaller satellites launched on smaller vehicles.

I thought I would have a look back 10 years to see how things have changed, because we are aware of the fact that any graph for rocket launch goes up. It was interesting to see that the equivalent figures from 2014 had an increase of 42% to 93%. But if you look at the payload mass, and bear in mind that space launch is effectively a shipping business—freight haulage—you can see that back in 2014, the launch from the rest of the world was 96 tonnes and last year it was 94 tonnes. It had fallen by 2%, because although there were more satellites being launched, they were a lot smaller. It might well be that we see that trend going forward, but based on the most up-to-date data, it is not climbing anywhere near as rapidly as I remember people telling me it would 10 years ago.

Baroness Stowell of Beeston: What do you put that down to?

Dr Martin Heywood: Part of it is probably down to a lack of supply. Also, when people look at satellite launch, a lot of it is aspirational. There is a market there for people to say, "I want to launch a satellite", but the funding never comes through for it. It also comes down to the growth in CubeSats, which are very small satellites. We have seen that the growth was 42%. These are small, shoebox-sized satellites, which are great for universities, but if you are in the space launch business, you are not going to pay many bills launching something the size of a shoebox.

Baroness Stowell of Beeston: The same original question to you, Mr Chambers: what is the UK's part of this market and how much do you think it is worth?

Phil Chambers: Dr Heywood made some very interesting points. You have to remember that, if you rewind another 10 years in the commercial satellite market, SpaceX was nowhere, and Arianespace was absolutely dominant. You saw senior executives at Arianespace laughing at Elon Musk's attempts to launch small rockets and fail. That has completely changed in 20 years, which means that we should not give up now, just because we have a large American competitor. We need to get our small launchers working and then we need to build bigger launchers.

It is absolutely true that you will not be able to compete on price, if you have a small launcher versus a big launcher, because the physics just determines that. But when you have built a small launcher, you have many of the core technologies you need to build a bigger one; you have proven it, and therefore you can get investment and crowd in private capital. We need the Government to back these programmes. We need anchor customers; it would be absolutely fantastic if the MoD could come in and say, "Yes, we want to procure some launchers from our sovereign launchers that we have in this country". We need a long-term plan to build the capability, because if we can get a working medium-lift vehicle that is scalable, which is what our European launch challenge bid is all about, we will be able to compete on price with SpaceX. We have places we can launch from. Yes, is not northern Scotland—it has to be equatorial, that is just the physics. But I absolutely believe we can build this capability in the UK. We do not see our partners in France, Germany, or Spain giving up because they have this massive American competitor; we see them absolutely spurred on, and that is how I see it too.

Stuart Fyvie: Phil has addressed the need for anchor customers to help drive that growth, so I will just make some comments on the commentary that we have heard and what we have picked up from research. On our side of things, there are only 14 active commercial spaceports in the world. There are over 100 places where you can launch but only 14 commercial spaceports. Of the 150 to 200 claimed launch companies, we believe between 30 and 40 are genuinely realisable. You have asked where they will launch from. I speak to launch operators week in, week out, and I also speak to spaceport operators. They all believe in the exponential growth of the launch market. If you do some

research, you can see that the commentators are all predicting between 10% and 16% growth annually in terms of the launch market. We are under no illusion that it is all risky, but using Phil's point about SpaceX and where it was 10 to 15 years ago, look where it is now.

- Q176 **Lord St John of Bletso:** You made a very good point that there is a real need for reliable launchers, and clearly launch capability is hugely expensive and launch providers need state agency support. I have three questions. First, what level of state support is required? Secondly, Mr Chambers mentioned about anchor customers, and earlier on you were saying that of the 2,800 satellite launchers, 1,300 were from SpaceX—

Dr Martin Heywood: Starlink.

Lord St John of Bletso: Yes, sorry, and of course we have project Kuiper coming in with Amazon. What scope is there to get these customers to use UK facilities? Finally, we know that SpaceX is making huge advances with reusable innovation, and I know that Mr Chambers said that Orbex is developing a partially reusable micro launcher. Is this a viable business for the future?

Dr Martin Heywood: SpaceX is interesting, because it came from nowhere, but came from nowhere with a lot of American Government money. So in terms of level of intervention, we can look at what it did. It is a success story, so let us look at what happened. The rocket engine that SpaceX uses on its Falcon 9 was developed by NASA and pretty much given to SpaceX. It was part of a commercial strategy for NASA to develop the technology then give it to anybody who wanted it to try to grow it, recognising that NASA is not best placed to grow commercially. It then had a number of government contracts: the resupply missions to the International Space Station, funding for a project to develop a lunar lander, and Starlink, which has a lot of American government money behind it contract-wise. It has had an awful lot of support to get to where it is and simply would not got started without that amount of money.

It is very interesting that it started off with its Falcon 1 rocket, which is a small launcher similar in size to the types we launch from Scotland, and very rapidly moved on to the Falcon 9 and beyond. Any support needs not just to say, "Can we have a rocket launching from Scotland in two years?" It needs to be well beyond that; there needs to be a road map for where we would go beyond that, which has to be into the medium or even the heavy launch. I absolutely agree with what we have heard about Ascension Island and that type of heavy launch.

It needs support, but it also has to be commercial in the long term because certainly I, as a taxpayer, do not want to be in a situation where we have to subsidise this in the long term. Having said that, we know that unless there is British government business going into it—as in British government paying for satellites—it is going to be very hard for them to manage commercially.

Phil Chambers: It is a capital-intensive sector with long development cycles, so government support is absolutely essential in the pre-revenue phase, not only to de-risk the private investment but to ensure that we keep pace with international competitors receiving substantial public backing.

Dr Heywood talked about the US, and all that is of course true; it is very well known about how those anchor Department of Defense and NASA contracts really helped the growth of SpaceX. We have seen how our friends in France, how President Macron put €400 million into small launches not that long ago, and we have seen levels of support in Germany and even Spain higher than in the UK. So I absolutely welcomed the UK Government's £20 million investment in Orbex. It was a strong signal of intent—but, ultimately, sustained strategic support will be needed to scale globally. We have seen a change of approach from the Government in the last 12 months. We have seen a move from peanut buttering—giving a lot of companies a small amount of money—to giving a few companies a bit more money, which in my view is likely to lead to more chances of success. I agree that we have to pick winners in this game, but this is a supply-constrained market and if we had a rocket flying today we would absolutely be able to fill it. Obviously, the anchor government contracts would then help crowd in private investment as you have something to lend against and all that kind of thing—so they would be equally helpful.

Stuart Fyvie: I echo the comments made regarding sustained strategic support from the state and the amount of money that other Governments are funding their space programmes with. It is great that Orbex has received £20 million in funding from the UK Government. It feels like the UK launch sector is at a bit of a crossroads, and perhaps we are at a Black Arrow point, where we have the opportunity to properly lean in to supporting the launch sector from the UK with the sustained economic and financial support that it needs. It is absolutely a viable business, but the investment needed to develop space launch capability, whether it is the vehicle or the space infrastructure itself, is investment-heavy.

Relative to the capital investment that the UK puts into other industries in terms of schools, colleges or further education or whatever it might be, the level of financial intervention required for space infrastructure is relatively low. There is really not much more to say on that, but in terms of Lord St John's comment on Kuiper, it would be absolutely mean Amazon's Kuiper going up against Starlink. It would be interesting to understand how Amazon would view the UK in terms of its latitude and accessible trajectories to really understand how it sees the UK as part of its strategy moving forward for its growth.

Lord St John of Bletso: Amazon has made it very clear that it is looking for a diversified launch portfolio, which potentially opens the door for launch facilities in the UK.

Lord Tarassenko: Space loves a split infinitive, does it not? We are all brought up "To boldly go where no one has gone before", and I am sure

that you are very interested in the split infinitive in the Industrial Strategy today about the launch capability. “We will work with industry”, here comes the split infinitive, “to develop capability to reliably and independently launch satellites from UK soil”. Reliably and independently launching satellites from UK soil seems to be a commitment in the industrial strategy, so it must be a great day to be talking about launch capabilities from the UK.

What is the next step that needs to be taken most quickly? I have already picked up three things: MoD contracts, bigger contracts rather than a lot of contracts for small amounts—and possibly a road map was mentioned as well. I do not know if you want to confirm that. As a second part of my question, obviously the space budget, despite this commitment, is finite. Is there anything that the Government should deprioritise, if they are going to prioritise space sovereign capability for satellite launches?

Phil Chambers: It is a great day to be speaking about this, because the long-awaited industrial strategy contained five space priorities, plus launch was explicitly mentioned. We are extremely hopeful that this will now realign some of the priorities of bodies like the National Wealth Fund. We engaged with NWF when it was called the UK Infrastructure Bank last year, and at the end of the process learned that space was not very central in the mandate, and it was very much on the edges of the fairway. The industrial strategy has hopefully now changed that picture somewhat. The amount of capital to be deployed against those priority sectors is £27 billion, which is a very significant amount of money. While there might not be billions in the space budget, there are certainly arm’s-length funding bodies that could support some infrastructure projects such as spaceports and scale-up manufacturing facilities that we need to build rockets at scale, and we absolutely welcome that. I am probably not going to comment on what should be deprioritised as it is obviously a decision for DSIT and the space policy team, but it is important not to give 1,000 projects a small amount of money. We should be picking things.

Lord Tarassenko: Picking out winners?

Dr Martin Heywood: Yes, absolutely. It was a mistake back in 2018, or whenever it was, when rather than the Government saying, “We’re going to have a spaceport here and we’re going to pull people together and build a launch for it”, they said, “Let’s all bid”. It is good that Orbex has come through that and is still here with us, but an awful lot of money has been spent with people and businesses that are no longer with us to get to where we are. It has to be a lot more focused going forward. It also has to pull together the skills that we have. We have great skills in this country. A lot of young people are now leaving university who have built and tested rocket engines as part of having studied aerospace. We did not have that when I was a student. So there are a lot of skills that we can actually build on. In the shorter term, it really comes down to those practical issues that you need to overcome before you can get your first

launch. I am sure you will have seen it far more than I have, but it is about trying to get the infrastructure built, trying to get through the planning issues and knowing that you have customers down the line so that you can build there.

We were lucky to get some government funding. I work as part of the Snowdonia Space Centre and we have a testing facility. We are not looking for support in terms of grants; we would now like to have some government customers come to us to use our facilities, because most of our customers at the moment are university-based. We need to grow the business from the bottom up. It is wrong just to think you can throw money from the top down at the investment level because you then fall off the cliff at that point. We have seen that so often in the launch business. We saw it with Virgin Orbit. You get to the point where you have had a few launches, you have a couple of failures, the money runs out and you go bust at that point. We cannot continue to do that. I would argue that, rather than subsidising, we should be looking to grow the demand for it so that when businesses such as Orbex are ready to start launching, they have their customers lined up with the chequebooks out.

Stuart Fyvie: On the comment on a re-evaluation of the priorities for spending in the UK in terms of space, it is certainly not my place or ability to comment on what should be prioritised. But on what the metrics are in terms of how we prioritise, looking at the economic impact of the space sector, and how decisions are made about where the money is spent and how benefits to the community really understood, you may look at launch from anywhere. But if you develop space launch capability in a deprived part of the country—if there is potential there—the potential transformational effect that a spaceport could have on that population could play a part in turning around population decline by retaining young people in the area. I am not sure if those benefits of the space sector are assessed and evaluated when determining priorities. I am not saying anything is less or more important, but there are real, long-term, sustainable potential changes that the space sector could have in areas of the country that have been ignored for decades. It would be useful to look at the way the money is being spent and understand what the cost benefit and the loss of those opportunities in those areas would be in arriving at what those priorities should be.

Q177 **Lord Shamash:** We have received evidence from the University of Strathclyde that suggests that it is, unprecedented for a state to develop a sovereign launch without the Government acting as the anchor customer. Does the UK need to have its own sovereign space programme to make a success of the launch, or will the European Space Agency contract suffice? I am very depressed asking that question by the way because I think I know the answer to it already, but I just wondered what you thought.

Phil Chambers: We should not underestimate the importance of ESA and the European Union as part of the European Launcher Challenge framework. People have asked me why they should go through the European Space Agency. The reason is not only that it vets it technically,

but you get access to the contracts, which is critical. It has very large science missions: Galileo, Copernicus, which we are in, and IRIS² coming down the track, which is absolutely important—but, of course, the more channels the better. The more business we can get from UK national security and the MoD, et cetera, the better. For example, we saw the French Ministry of Defence award four launch contracts to one of its micro launch companies just two weeks ago. If we could see that kind of thing in this country, it would really help.

Dr Martin Heywood: To take the American example again, NASA, as the space agency, has a space programme but the US Air Force also has a space programme. It would quite honestly be silly for us to set up our own space science programme, sending our own probes to Mars, when we can do it far better working with ESA. We should absolutely be fully engaged with ESA. On the other hand, when it comes to defence and security, there is a massive role for the Government to play as a client and a massive role for the industry to play in supplying something unique for the UK.

Going back to the previous question about prioritising, the Government have made it very clear they want to prioritise an awful lot of money in defence. The space industry should be banging the drum and saying, "We can offer an awful lot to defence, don't spend it all on submarines or whatever, come to us". We know that certainly when it comes to intelligence, the future is already in space, but we need our own sovereign capability there. The way forward would be a UK programme that complements what ESA is doing rather than trying to compete with it.

Stuart Fyvie: I could not have put it better myself. My fellow panellists have covered all the points, and they have articulated them far better than I could, so no further comments.

Baroness Mobarik: If possible, can I just lump a whole load of questions together?

The Chair: Please do, as long as our guests can cope with it.

Q178 **Baroness Mobarik:** Perhaps everyone can choose the bits they want to answer. First, in previous years the Government developed big plans for multiple spaceports but only two are currently licenced and only one seems close to operation. There was a big vision there, but where is it now, and is there a need for more than one spaceport in the UK? We heard in an earlier session about the need for more satellite constellations, which means a need for greater capacity for launch, I guess. It has been reported that £14.6 million of public money has been invested thus far in the Sutherland spaceport, including funding from the Nuclear Decommissioning Authority, the UK Space Agency and Highlands and Islands Enterprise. Are the public likely to see a return on this investment? I have heard another figure of it being £9.1 million, so I would like to know which one it is.

Finally, given that spaceports are often located in coastal or remote areas, which are regions that are frequently in need of economic regeneration, what would you identify as the principal benefits of the space industry to local communities? I would really like Stuart to perhaps tackle that one. For you, Phil, conversely, are there potential risks or unintended consequences, environmental, social or economic—for example, in going over Icelandic waters. Are these projects genuinely inclusive and sustainable?

Dr Martin Heywood: I suggest that you two go first, because I shall probably put a negative spin on it.

Baroness Mobarik: Let us get the negative spin first so we can be left feeling really positive.

Dr Martin Heywood: The environmental aspect of it is something that is being ignored at the moment. The space industry globally is still stuck in the middle of the 20th century. I find it quite surprising that while we all take so much care at home to make sure we separate our recycling from the general waste, we still throw away most of our rocket launchers into the sea; we still throw away practically all our satellites. At the end of its life, a satellite re-enters the earth's atmosphere and burns up, so effectively you are incinerating toxic waste in the upper atmosphere. That did not matter when there were only half a dozen satellites or so re-entering each year, but the larger constellations such as the SpaceX Starlink constellation are enormous. There are 12,000 minimum, maybe up to 40,000 or 50,000 satellites that are going to need replacing about every five years. Even if you stretch it out to 10 years and imagine a smaller number, such as 12,000 every 10 years, that is 1,200 a year re-entering the earth's atmosphere. They weigh a quarter of a tonne. So you soon start to realise you have something of the order of the International Space Station coming down every year burning up in the upper atmosphere. First, we will see what the damage is, but that amount of material burning through the ozone layer is going to put a hole in it, there is no doubt about that—it is just a question about how big the hole is. But also—what a waste. If we have launched all that material, why are we not using it up there?

One area that we have not touched on this afternoon that the UK is getting into now is in-orbit servicing, which provides the technologies to enable satellites that are launched to stay in space for longer, for example, by refuelling them. That is an area where we can certainly address sustainability. I am worried about constellations and am also worried about Kessler syndrome, which is when the satellites start to hit each other and create debris which then expands. To me, statistically it is a matter of time, because although the risk of any satellite hitting another satellite is small, if you have 50,000 satellites and those Starlink satellites from a whole range of different orbits are not all under control at any one time, it is an accident waiting to happen, if we are not careful. While I am obviously a space enthusiast, and I want to see it growing, I want to see it growing sustainably. So that certainly bothers me.

There is an opportunity for the UK because we are great innovators in this country. I just have a gut feeling that we cannot continue launching satellites the way we launched Sputnik forevermore. We have reusability now, so we can see the idea of getting the first stage back. We see companies like Space Forge looking into reusable satellites. We will have to see in time whether their concept works, but there will be satellites that are launched and brought back. There will be more effort going into launching satellites and servicing them so that they become durable and are not just single-use products. Those are all things that we can certainly do in this country.

If I may just pick up on the point about local communities. I grew up in a very deprived part of Wales, and one of the reasons that I got involved with the space centre at Snowdonia is because that is where I grew up. My school was literally just up the road from there. Like most people, I had to leave home at 18, go to university then find a job elsewhere, because there were no high-value jobs in Snowdonia, so I do not think we should underestimate the importance of bringing this high-value employment into those areas which, to be honest, are becoming depopulated—because if you are career-focused, you leave and do not come back.

Stuart Fyvie: I am afraid this is going to be a long answer, so I will get through it as quickly as I can. So there are only two currently licensed and only one seems close to operation. Just an observation: Sutherland was mothballed in December when it was seven months away from completion, which would have pegged it to complete the same time as SaxaVord. I have two examples of whether it will see a return on its investment. The Virginia Spaceport Authority in the US advises that, for every dollar invested in the spaceport, \$2.9 million returns to the local economy. Houston Spaceport, which is a licensed spaceport at an airport, has not launched but has been a hub for space businesses. It started, I think, in 2007 with 25 people and since then the businesses have grown and attracted new interest and it now has 2,000 people working at the spaceport and it turns over \$10 billion; those figures are from the Global Spaceport Alliance.

On what a spaceport means to a community, spaceports by their nature are located in rural parts of the country that are sparsely populated. Given the panel today, I thought we would use Sutherland as an example of what it could mean to the community. Conveniently, a report was published last week by BiGGAR Economics on the depopulation challenges that are facing the north-west Sutherland region in the north of Scotland. First, I shall paint the picture of north-west Sutherland and how a spaceport could benefit that community, with facts from BiGGAR Economics—so there is data behind all this. There is severe depopulation. Since 1900, the area has seen a 65% loss of population. Since 2001, it has seen a 9% loss compared to a 13% average rise. By rough calculations and comparing it to the UK average, the population in the north-west Sutherland region should be 1,300 more than it is now. The report looks forward to 2045. I appreciate that this is a space committee

not an economic development committee, but it is important to cross-reference the two because they are very much interlinked. There is an ageing demographic and by 2024, if the trend continues without a mitigating impact, it is predicted that 60% of the population will be over 65 years old compared to 19% of the UK average, and children will be “vanishingly scarce”, which is quite shocking in itself. There is a falling workforce. In 2023 the number of working age population was 1,500 and by 2045 it will be reduced to 610. In terms of poverty and deprivation—a colleague mentioned this a minute ago in relation to Wales—Sutherland sees that a lot of the community is in the second and third quintiles of the Scottish index of multiple deprivation. So without mitigating interventions, the situation is quite bleak.

The spaceport is not the silver bullet; it is just part of a series of mitigations that can help. How can the spaceport contribute to the solution? There are direct gains and indirect gains. The direct gains are employment directly by the spaceport or the launch operator whose personnel happen to reside in the area. The indirect gains are the supply chain in the local area that will support the spaceport itself. As I mentioned earlier, our launch campaign is about 20 to 30 people. The launch operator will come up to the spaceport for six to eight weeks, and that will vary from launch company to launch company, which is 20 to 30 people who will be arriving in the area for a period of four to six weeks for, say, 10 to 12 launches per year per launch pad. That is 360 people who will be in the area all year. I have talked about the depopulation of 8.8% since 2001; that 360 people will equate to 6% of the population coming back. If the skilled workforce resides in the community, that would be fantastic. If they have families and continue to work there, that is excellent. Those 360 people need to be fed, watered, entertained and provided with transport, and facilities will need to be maintained and secured.

There is also tourism. In the area of Sutherland spaceport and the Moine peninsula where it is located, we see huge potential to expand. We think it is an underutilised asset at the moment. The Orbex spaceport will definitely contribute to the local economy, but to really maximise and optimise the potential of the Moine, to introduce some transformational change, there is ample capacity on the site for increased launch use. There are also non-launch revenue streams such as UAV testing or ground stations, much in the way that SaxaVord is expanding its revenue also. It is not usually brought up at space committees, but tourism in the Scottish economy contributes 5% to GDP, which is significant. There is a lot of flow through on Sutherland and in Shetland, and there is a massive opportunity there; it is the halo effect. It will bring high-skilled jobs, but there is also a huge opportunity for everybody else to benefit from those communities. The opportunity is basically to bring the population up and create long-term support for these jobs.

Phil Chambers: I shall try to address each one in turn. As you rightly pointed out, many of these launch sites are in environmentally sensitive locations, sites of special scientific interest, where there is peatland and

rare, red-listed breeding birds. It is incredibly important that we treat those sites with the care and attention they deserve and take those facts into account. That said, Orbex is trying to build the world's most environmentally friendly rocket. We have looked at three different aspects, and one of course is the fuel. We are using biopropane, which is not just a question of picking fuel off the shelf—you have to develop the entire engine system around it, which has been a 10-year process. The second is developing a reusability system. We have a global patent on this reflight system for the first stage, so that we do not just drop it into the Iceland Sea but recover the stage and use the engines again. The third is zero debris; we do not want to leave anything in space, so demising the second stage. It is a good point, and I agree that we should look further at what the impact of that demisability is in the atmosphere. Of course, on the spaceport itself, we are restoring all the peat that we have had to change. The road up to the pad is a floating road, so it does not cause any damage to the underlying peat.

On how many spaceports the UK needs, it is really a matter of timing and when launchers that want to launch from the UK are ready, and of resilience. If you have one spaceport and there is an accident, you might not be able to use the spaceport until such a time as it can be repaired. It is worth noting that pretty much every pad at SaxaVord is now full. I would like to bring to the attention of the committee that the amount of launches that you can do per year is actually a planning consideration. We have critical national infrastructure, and the amount of capacity that we have in that infrastructure is determined by the local council, for good reasons. But it is worth noting that we have permission to do 10 launches a year from our SaxaVord pad, and we have permission to do 12 launches a year from our Sutherland pad. If the business case needs you to do more than 22 launches a year, you need another pad or another spaceport. At the moment, I believe there is a case for at least two spaceports, and in future there may be a case for more, but it depends on how many pads you can build at each spaceport and what sort of planning permission you can get, which in turn depends on the council, the environmental restrictions and the weather—how good the weather is in the winter, the winds aloft, all these types of factors.

We then come to the money invested. There have been several figures seen in the press, I think £14.6 million was one, and £9.1 million was another. Orbex has received £2.6 million of public money from Highlands and Islands Enterprise, funded via HIE from the Nuclear Decommissioning Authority to develop the Sutherland spaceport. We have invested around £8 million, of which £2.6 million is public funding. Obviously, we intend for those economic benefits to be realised by the local community. Stuart has spoken about those at length, so we do not need to elaborate. This is really a matter of timing and when the business has the required capital to go back and complete that project.

The Chair: Thank you very much. You have been extremely generous with all your answers. We have one final question.

Q179 Lord Clement-Jones: We have touched on the whole question of sovereign capability, but how important is the possession of sovereign launch capability from the perspective of national security? I wanted to put that in the context of the fact that the UK often deploys what is called an own, collaborate or access framework when assessing core national security capabilities. We are clearly seeking to own sovereign launch capability. Why should we not focus more on collaboration with other countries and accessing capabilities where they exist elsewhere? I am not really asking you to make an argument against yourselves, but what are the positives here?

Phil Chambers: Launch is a domain where ownership is essential. Collaboration and access are valuable, but they do not really replace the strategic assurance of having a domestic capability. It actually complements co-operation. We can offer our service for assured launch to our partners. We also ensure the UK is not left behind in this rapidly evolving space landscape. If you look at what has happened in the past, you see that we had the Russian invasion of Ukraine, which led to sanctions on Soyuz, which launched 56% of European satellites at that time, which was not great. Then we had delays in Ariane 6 in Vega-C in Europe: single points of failure. We have a US launch managed by a private individual. The US is now less willing to be the security provider for the world; we do not have that safety net. If we want to react to world events and have a responsive launch, that capability really needs to be sovereign. We can support our NATO partners with that capability through STARLIFT.

Lord Clement-Jones: Thank you. Martin, did you want to add anything to that?

Dr Martin Heywood: Yes, we have had the bitter experience that we have tried collaborating and partnering with other countries for many years. In the 1960s, we were part of a three-way collaboration for a European launcher, which collapsed and left us developing our own at the end of that. As I mentioned before, we sort of gave up our own launch capability in the early 1970s to try to launch in America, which did not come to anything, or at least it was not as satisfactory as we would have liked. We cannot expect anyone else to have the same priorities as the UK. This is one area where the UK needs to show a little leadership, and then it can contribute. It is an area where we know we can contribute and we have been contributing on the small satellites, for example, for many years. We need to put our necks on the line here and take some leadership on this and have our own launcher. Other people can then come and collaborate with us. Let us show some leadership and let them come and collaborate with us for a change.

Lord Clement-Jones: Put the boot on the other foot, so to speak.

Dr Martin Heywood: Yes.

Lord Clement-Jones: Stuart, do you have any contrarian views here?

Stuart Fyvie: The Strategic Defence Review published earlier this month positions sovereign launch as a critical enabler of the UK's deterrence posture, national resilience, industrial strength and alliance and credibility. We want to ensure that the UK has assured access to launch earth observation satellites at short notice, providing that resilience and against redundancy either from bad actors or for any reason. It could be the weather, on-pad issues, anything out of the spaceport, which could put spaceport out of action. The system, therefore, cannot just have a single point of failure. There needs to be a plan B. It is really about promoting the need for a secondary launch site in the UK for those vertical launches.

In terms of collaboration, we hear that other spaceports are keen to collaborate. There are already bodies and organisations set up to look at interoperability between global spaceports. So if one is unable to facilitate a launch, it can send the rocket company over to a friendly spaceport so it can do the launch there then send them back. The Global Spaceport Alliance is a big advocate of the need for global collaboration. As my colleagues will testify, it is not easy, but there is a desire and a general need and awareness that we need to collaborate for us all to succeed.

Lord Clement-Jones: Very convincing, thank you.

Lord Tarassenko: I am looking for two words in the answer, and it is addressed to Mr Chambers: when can we expect the next launch at SaxaVord? I just want a month and a year.

The Chair: We will pressure you.

Phil Chambers: We can expect a launch from SaxaVord in 2026 for sure. I am not sure which month it will be.

Lord Tarassenko: What is your best estimate?

Phil Chambers: There is a race on. We would aim to do something around the summer.

Lord Shamash: Can we all come and watch, please?

Phil Chambers: Absolutely.

The Chair: I have to tell you that the summer in governmental terms is anywhere from April to October.

Lord Clement-Jones: Exactly, there is plenty of flexibility there.

The Chair: Can I thank you all very much? You have been incredibly generous with your time. We have learned a huge amount, and it is such an important subject. Thank you for being with us. I will end this session.