# Inside Octopus Flexibility

**Russ:** [00:00:05] Thanks for listening to Inside Octopus. My name is Russell Goldsmith, and in this episode, we're going to be discussing flexibility in the energy market, and so to help explain what this means and update us on the developments Octopus Energy Group is making in this important part of our business, I'm thrilled to be joined online by our global head of flexibility, Alex Schock, together with Devrim Celal, Chief Executive Officer of KrakenFlex, who actually joins us from Istanbul today and who I will come to first. So, Devin, this is the first time we've heard from Kraken flex on inside octopus. So, let's start by you giving us a quick introduction to your part of the business.

**Devrim:** [00:00:42] Of course, thank you Russell. KrakenFlex is a software platform we call a Flexibility Platform. Its primary objective is in the new energy system, the ability to control assets. And these assets are anything from your small domestic appliances, heat pumps, electric vehicle charging infrastructure, batteries, and all the way through our generation spectrum of solar and wind and ultimately utility scale batteries. We connect these assets, we monitor them in real time and we're able to control them, but we control them to ensure that they're always using the cheapest and greenest electricity possible so we can enable a transition to a system that relies on renewable energy.

**Russ:** [00:01:26] And the company only recently joined or became part of Octopus Energy, didn't it? Because you originally started in 2014, is that right?

**Devrim:** [00:01:34] That's right. We started in 2014 as Upside Energy and in November 2020 we decided to join the Octopus Energy Group. And it has been an incredible journey so far.

**Russ:** [00:01:46] Great stuff. Alex, before we take a deeper dive into this particular topic that we're focusing on stage, do you want to just explain exactly what we mean by energy flexibility?

**Alex:** [00:01:55] Yeah, happy to Russell. I think the energy industry, as with a lot of industries is, is right for jargon and kind of making things more complicated than they really are. Fundamentally, the way to think about it is any electricity system, any grid needs to constantly be balanced between supply and demand. And you're doing that in real time. And so, in the old fossil fuel generator world with big coal power stations being the primary backbone of power generation, you would have a couple hundred generators that can be turned up and down so that they're kind of meeting the overall national energy electricity demand. Now, in the new world, as we transition to a net zero energy system, we're going from a few hundred fossil fuel dispatchable, by dispatchable I mean you can easily turn them on and off, to tens of thousands and soon hundreds of thousands of renewable generation plants wind, solar, geothermal and other sources which are inherently intermittent because the sun doesn't always shine, and the wind doesn't always blow. And so, managing the supply and demand balance becomes a much bigger challenge, a much trickier challenge, because you need to make a lot more adjustments across the country and across the whole all of Western Europe, for example, which is an interconnected energy system. And so, when we talk about flexibility, it's one of the core elements of a net zero system. And you just need a lot more flexibility than in the traditional system. But that's actually also a huge opportunity because we’re electrifying transport or electrifying heating, all of all of these new assets, which are going to be millions of assets, can all participate in delivering that flexibility. And that's where we come in with KrakenFlex at its heart, enabling this future.

**Russ:** [00:03:51] Is there a particular time when the grid really does get stressed then?

**Alex:** [00:03:56] Yes, yes, multiple times. But the most traditional time is in the evening peak. So, when everyone gets home, when everyone's cooking dinner, when suddenly you have your sole, that's the single biggest peak in any given day. And then you can have the even bigger peaks, like the Christmas days and boxing days, where shockingly, whether we like it or not, we're generally in with family and all kind of cooking at the same time.

**Russ:** [00:04:22] Is that old myth about as soon as the advert break came and everyone they used to say, go and make a cup of tea. There was like this huge peak. Is that actually true then?

**Alex:** [00:04:30] That's actually true, actually, when England's women's team won the Euros, you can see the same thing. There's a huge spike at half time.

**Russ:** [00:04:40] Unbelievable. And you mentioned as you were explaining that you touched on Western Europe there. I mean, I'm guessing this is not just an issue in the U.K. that, you know, this load on the grid.

**Alex:** [00:04:52] No, it's this challenge, which is a big part of the overall decarbonization challenge, is the same in any energy system that is currently decarbonizing. So, the solutions that we're developing and bringing to market are not just applicable in the UK but around the world.

**Russ:** [00:05:10] Okay. What are the main challenges in moving to energy flexibility then?

**Devrim:** [00:05:15] So when we look at the current situation and we're talking about flexibility, the UK system has about 62 gigawatts of flexible power. What we mean by that is at any moment in time the National Grid has access to gas, fire plants, coal and other plants that they can control to vary the output by 62 gigawatts. When we look at National Grid's future scenarios, we see that in the not-so-distant future, that amount is going to go up to around 220 gigawatts of flexibility required. What's driving that is the push to decarbonize transport and heating, which happens through electrification. So our consumption of electricity will increase. Our relationship as a society with electricity will change. But that increase 160 gigawatts increase in flexibility is largely assumed that it will come from consumers participating in the energy system and allowing the retailers to decide when is the best time to charge their electric vehicles. Because, as Alex mentioned, 4 to 7 p.m., the evening peak is when the grid is constrained and as it so happens most people will get home during those periods. They will plug in their electric vehicles and cause an even bigger peak of electricity, making it even harder to generate that electricity. So, I think the biggest challenge that we're facing is winning the trust of consumers to allow their suppliers to determine when is the best time to charge their cars, what is the best way to heat their homes and so on and so forth.

**Russ:** [00:06:59] And so, as you say, with the amount of people now, for example, increase in electric cars, all this extra demand, the heat pumps that are being installed now. So, what are the new technologies or asset classes that are going to be introduced to help cope with all this then?

**Devrim:** [00:07:14] So electric vehicles, electric vehicle charge points are we believe we're at the inflection point now. More than half the cars sold in the UK recently have been electric. At Octopus Energy, we're working very hard on the decarbonization of heat. We're launching heat pumps. We're going to be selling, hopefully a lot of them to meet the government's targets and exceed them. But also, we need to continue with the installation of solar and wind at all scale as much as we can, because that's the only way we're going to reduce our reliance on fossil fuels. We're hearing talk of more batteries in homes as electricity prices spike. People have a larger desire to store the solar that they generate themselves and use it when prices peak. But I would say those would be the three major categories. Initially, electric vehicles, then heat pumps, then batteries.

**Russ:** [00:08:07] And talk to us about the demand side response and why it's so critical to the evolution of the grid then.

**Devrim:** [00:08:11] So if you go back to the earlier story I told where we need an additional 160 gigawatts of flexibility in the system. The assumption is that about half 80 of that will have to come from demand side response. Now, some of it would be industrial response, but I expect that the larger portion of that will have to come from electric vehicle owners and heat pump owners.

**Alex:** [00:08:35] I think one interesting thing to think about in that context is, as Devrim mentioned, about 62 gigawatts of flexible flexibility in the system today. If you look at within that, less than ten gigawatts is not carbon intensive flexibility. So, it's less than ten gigawatts within that 62 gigawatts, will survive in a net zero world, if you will. So, the size of the challenge of scaling up that amount of flexibility across the energy system is really, really big.

**Russ:** [00:09:06] Alex sticking with you, how is octopus energy working with the wider sector then to help support this transition?

**Alex:** [00:09:10] So I think we look at this on multiple fronts and Octopus Energy is a technology company at its core with a desire to lean forward and kind of lead the way. And that's been very much at the centre of how we've engaged with the sector, with industry, with government. We have the largest portfolio of smart tariffs. So the next generation of tariffs that are leveraged smart meter technology to provide better value to customers based on them shifting their energy usage. We work with National Grid, National Grid Electricity System Operator, who run the whole energy system in the UK, to showcase how all of these new technologies can be part of the solution, as Devrim mentioned before, can be can really be relied upon to make up some of these needed gigawatts of flexibility. So, we just concluded the power loop project which is vehicle to grid, where we dispatched these vehicles to these vehicle to grid EVs in the balancing mechanism, which is the UK's largest real time flexibility market. We did a program called the Big Dirty Turndown in February and March of this year where we recruited 100,000 of our existing customers and asked them to reduce their consumption in a specific time window in exchange for financial reward. This was so successful that National Grid is now rolling out this service to the whole to the whole market starting November 1st of this year. And it's going to be a key tool to help balance the grid in what is going to be a very challenging winter. And consumers who opt in because it's not mandatory. It's all everyone can choose, could earn as much as £100 over the course of the winter by participating in this program. So we're really engaged on a lot of fronts with National Grid, with the DNO’s, the network operators who manage the poles and wires bringing electricity into your homes and into businesses, but also with the regulator, Ofgem and Government. There's a couple other projects that you might be interested in as well. One of them is what we call the Windy Day Fund, where we worked with Scottish Power Energy Networks. So they're one of the network operators in the UK and they have a part of their patch of their network in Dumfries and Galloway in Scotland. And this is part of the UK that has some of the highest percentage of wind generation but the lowest population density. So they have a really big challenge because they don't have enough local demand to use that energy. And they can't transport all of it onto the transmission network. Think about it in terms of road infrastructure. There’s not enough connection points from the a-roads onto the motorway. So, it causes congestion. It's the same thing in the electricity network. And so, they end up paying the wind farm operators to turn off, and we waste all of this energy. In the energy world, this is called curtailment. In the last year when so much wind energy was curtailed that could have powered 750,000 homes for a year. And so we worked with Scottish Power Energy Networks and said, look, we've got some customers in Dumfries and Galloway. If you tell us when you're going to have too much wind, we'll contact those customers and tell them, you know what? In these hours, every kilowatt hour, every little bit of electricity they use is free. And that really showed that they could, instead of wasting it, people just baked cakes, charged their EVs, used electricity in abundance. And that it's not just about reducing electricity, it's about matching when there's excess energy and that we're using it instead of wasting it. And one of the bigger long-term projects that we're working on is called CrowdFlex, where we're really helping, I mentioned before we have the largest numbers of customers on smart tariffs, and smart tariffs are a very big part of how the future energy system we run because we can really help put customers, give customers the tools to use energy when it's in abundance and green energy when it's in abundance. And CrowdFlex is all about kind of helping the industry overall understand the power and potential within that. And it's a multi-year project that we're doing it together with the Centre for Net Zero run by our colleague Lucy and National Grid and a few other partners.

**Russ:** [00:13:23] Can you share any of those initial findings from the CrowdFlex project?

**Alex:** [00:13:27] So we talked a little bit about the peak every day and Devrim mentioned how much EV charging and managed EV charging can help or mitigate in that future world. One of the initial findings from the first phase of crowd flux was that managed EV charging can reduce the peak by over 15% so that we're talking about gigawatts of saved kind of peak congestion. And that has a benefit not just for the people charging their cars, but for every consumer in the U.K., because all of this balancing cost, like running these markets and balancing these balancing the energy system fit out fundamentally gets put on everyone's bills. And so, it's in the benefit not just of the individual consumers who are on smart tariffs and who have their devices managed, but it actually benefits everyone in the UK.

**Russ:** [00:14:19] And talk to us a little bit about Equinox. Can you explain that program as well?

**Alex:** [00:14:23] Well, Equinox is actually one of the newest programs that is just kicking off right now. And it's all about heat pump flexibility and how much can that really help the system? Heat pumps have been around for a long time, but there's a huge amount of unknowns because it's been it's been a bit of a cottage industry in the past. And a lot of these, historically, heat pumps haven't really what I would call been smart. They haven't been connected. You can't really schedule them to run against certain peak times and run most cost effectively. And Equinox is a program working with a network operator called Western Power, who they manage the network in the west of the UK to show how heat pump flexibility can benefit all consumer types, including vulnerable consumers, including fuel poor consumers and council housing, which we're very excited about to really show. This is not just this is benefits that can span across society.

**Russ:** [00:15:19] And I guess one thing that a lot of people listening to this podcast are going to want to know is at the end of the day, you know, what difference is this going to make to my energy bills, which we know are just constantly increasing at the moment and I'm thinking businesses as well as households here, can you kind of shine any light on that at all?

**Alex:** [00:15:36] Yeah. So, I think in the current situation, it's a very real crisis that we have to kind of get through. And I think in the near term, there's it's really on government to provide the support for consumers. But in the longer term, what we need to do is not be in the same situation again. So not be in a situation where gas power generation and the cost of gas is driving up the total energy cost. And we do that by building, as I mentioned before, much more renewable generation at every scale from residential to huge utility scale generation and have a truly dynamic, flexible system because the cost of generating a green electron is already today dramatically cheaper than the cost of generating a fossil fuel electron. And so, what we need to do now is now that we've solved the generation cost challenge, we need to solve the balancing and kind of whole system operation challenge and drive down that total cost. Once we do those two things, we’ll have security of supply and we'll have a much more cheaper and more efficiently run energy system.

**Russ:** [00:16:38] So, Devrim, Alex has just talked through a number of trials and programs there. I mean, what are the next steps following these successful trials that you've been putting in place?

**Devrim:** [00:16:48] So actually, it's something to build on Alex's last point. Flexibility is not new. Energy system has needed flexibility from day one because you need to balance supply and demand in real time. But that flexibility was always provided by fossil fuel-based generation and large industry, and they reaped the value of that. They benefited from that. The new system we're talking about is a system where consumers provide the flexibility, and they benefit from it. And some studies estimate that there's about £10 billion worth of value for consumers to participate in these systems, which will enable the adoption of all the low carbon or zero carbon technologies that we're talking about. But I think going back to your question, Russell. But I think we've proven in a number of cases through these trials, but also some commercial products, that consumer flexibility or consumer participation in markets is possible, both from a technological point of view. Maybe the easiest one was that then building a operational model where that can scale and can be easy and straightforward for the consumer but also be proven commercially, it actually makes sense. I think the last challenge that remains is changing markets and regulation, adapting markets and regulation to break the final barrier. I think once we put all those in place, consumer flexibility will flourish, and consumers will participate in the energy system.

**Russ:** [00:18:17] Are you confident, though, that those regulations are keeping pace with the rate of change required to deliver this smart, flexible grid of the future?

**Devrim:** [00:18:24] So we're talking to a global audience here, I assume. So, I would say UK is probably one of the leading countries when it comes to that. There are many countries, and every country will have a slightly different situation. So, if you're in continental Europe because it's an interconnected system, it's slightly easier to manage. But UK being an island nation has had to forge ahead and create a lot of systems and regulations that enable flexibility before anybody else does. So, I think in that way I am confident that we're already ahead. But I'm also aware that there's still quite a bit of work left to do.

**Russ:** [00:19:02] And on that global nature, you know, what are the tariffs? Because obviously we mentioned that this is not just a UK issue. What other territories are your team at KrakenFlex currently working in then?

**Devrim:** [00:19:10] We're quite excited about this actually, until about 12 months ago we were only in the UK, but today we are in Ontario, Canada, we're in Texas, which is interestingly another island from a electricity grid perspective. It's not connected to the rest of the US. We are doing projects in Belgium and Germany with actually system operators. So working with people who manage the system as opposed to consumers who participate in it. We have early-stage projects in New Zealand and probably one of the most exciting prospects at the moment is Japan. We are got a team on the ground and we're developing the capability there.

**Russ:** [00:19:48] Exciting. Alex, before we finish off, I just wanted to ask about Intelligent Octopus, which I guess is a product of Octopus Energy that shows flexibility is happening right now. Can you tell us a little bit more about that?

**Alex:** [00:19:59] Yeah. I think it's the most it's the most interesting product. I would say that we have that we've released in the past in the past year because it's not just a tariff. It's actually the first coming together of KrakenFlex and Kraken. And both our retail energy technology platform, which I know we've had talked about in previous episodes and KrakenFlex and all the capabilities that Devrim described, together with our brand-new mobile app. And what it does really is that it connects to devices, it connects to TVs, it connects to heat pumps and home batteries. We've focused on EVs for now. And what it does is that it manages EV charging and it's integrated in a dynamic tariff. So basically, customers know that if they let Intelligent Octopus manage their car charging or their heating, they get a specific discounted unit rate for whenever that is happening. And in the background, we aggregate up the thousands of customers that we have on this tariff already, and we use that to help balance the grid, as we talked about before. And we're getting actually paid for that today already. And so, it's real. It's not this you know as Devrim mentioned, yes, we have a lot of trials and programs to kind of showcase the art of the possible across industry and drive change faster. But Intelligent Octopus is a real-world commercial product, an offering that lets consumers benefit today. And we're very excited about it because it's launched in Texas. It's launching in New Zealand. It'll be launched in France early next year. I don't know Devrim if there's anything else you want to say about Intelligent Octopus.

**Devrim:** [00:21:36] I was going to say Russell, you left the best for the last. When I talked about, we've got this working now in terms of technology, operations, commercials, Intelligent Octopus was what I was referring to. It's automated the consumer participation to such a level that consumers sign up independently of any manual interaction. They register their vehicles or heat pumps in without any phone calls or broken steps in the process. We test it, and it's the first time that a electricity retailer asks a consumer what they really need. And based on that consumer input, we can determine what's the best way to charge a car or operate the heat pump so that they get the best possible price for their heating or charging their batteries.

**Russ:** [00:22:31] Excellent stuff. Well, listen. Just to finish off before we go, have you got any final message for our listeners on what they can do or how they can get involved in this area? Alex, maybe you can go first.

**Alex:** [00:22:45] Well, I think we've articulated the size of the challenge and that it's not just the UK challenge. And we're constantly looking for people across the business to join Octopus in the different teams that support this effort. And so yeah, keep an eye out on the, on our job vacancies board. We're hiring everything from developers to business developers to market analysts. Yeah. Come join the party.

**Russ:** [00:23:08] Fantastic. Devrim, any final message from yourself?

**Devrim:** [00:23:11] I'll echo that. Wherever you are, give us a call. But if you're a consumer, engage with the system because the future will only happen if consumers participate in the system.

**Russ:** [00:23:24] Tremendous. Alex Schoch and Devrim Celal, thank you for being on the podcast. That's actually it for this episode. As always, if you've got any comments on anything we've discussed today, please do get in touch via the website at Octopus Energy or via the usual social channels. But for now, for me, Russell Goldsmith. Thanks for listening and goodbye.