



A CONVERSATION ON CLIMATE

between **Dr. Michael Spence**, Chairman of the
General Atlantic Global Growth Institute

& **John Browne**, Senior Advisor to
General Atlantic and Chairman of BeyondNetZero

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The **BeyondNetZero** (BnZ) team will seek to invest in growth companies delivering innovative climate solutions and aim to help them scale. BnZ looks to identify entrepreneurs with technologies that enable companies to meet and exceed Net Zero emissions targets, with a focus on decarbonization, energy efficiency, resource conservation and emissions management.

BnZ combines General Atlantic's growth equity experience with a global team of proven climate investors, advisors and industry executives, including Lord (John) Browne of Madingley, who serves as Chairman of BnZ. This diverse team of experts brings decades of experience in both addressing climate-focused problems and building pioneering growth companies.



The **GA Global Growth Institute** seeks to advance the conversations around the nature of global growth today, not just as a number or metric, but from a microeconomic, bottom-up perspective. The Institute seeks to uncover the enablers and drivers of growth, and the multidimensional patterns that move according to distributional issues. We focus on innovation, entrepreneurial dynamism, digital enablement and their broader impacts on societies.

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**MIKE SPENCE**

Chairman of the General Atlantic Global Growth Institute

John, I thought we'd start with the sheer scale of the investment that's required on a global basis to address climate change. Can you give us some context?

**JOHN BROWNE**

Senior Advisor to General Atlantic and Chairman of BeyondNetZero

The best estimates I've seen suggest that to limit the rise in global temperatures to between one and a half and two degrees, we need to invest around three and a half trillion U.S. dollars a year, every year for the next ten years. So even with a 50-50 split between public and private capital, that's a tremendous amount of private sector finance.

This is perhaps the biggest transformation of production, consumption and industrial activity since the introduction of coal into manufacturing. It is a very big change, and it will take a lot of time, resources and consistency to get it done. But if we fail, global temperatures will continue to rise and that will have its own huge impact on humanity and huge costs.

MIKE SPENCE

If this investment is on a global basis, how are we going to get that done? What kinds of impacts and outcomes do you anticipate? What kinds of obstacles might there be to progress?

JOHN BROWNE

The biggest emitters of carbon dioxide and methane, the two biggest greenhouse gases, are still the United States, Europe and China, with India fast following. These places should be the principal areas of focus. It is easy to say that the world has to take action, but I am not aware of any global mechanisms that really work very well. Almost everyone has concluded that global government is neither achievable nor desirable. So we are probably looking at the sum total of local solutions, including at the state- and city-levels, as we see in the U.S. Even if we end up with the same solutions being adopted everywhere over the long term, the rate of implementation will be different in different places.

This means aligning a lot of people around the world. In places like the U.S., Europe, China, or India, there are mechanisms by which we deliver things. We have rules, regulations, incentives and disincentives. If these are applied consistently, change can happen.

But there are some places in the world where there are no enforceable national delivery mechanisms, and we have to think about how to get things done even more locally. In these cases, it seems to me that we need to offer solutions which both reduce CO₂ and make people's lives easier. For example, the collection of biomass, leaves and wood for cooking takes a lot of time. If we could find a way of replacing that process with energy from a solar panel, everyone would be much better off – no CO₂ and more time.

So it's all about the sum total of local solutions under the umbrella of a single objective, which is to reduce emissions to a safe level.

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MIKE SPENCE

One more thought on that: some of these countries are not as far along as China is — take India as an example. It's got a long way to go. It's going to build quite a lot of electricity generating capacity.

When we look back at it from the 2050 time horizon, most of the electricity generating capacity will have been built between now and then. Unlike some of the challenges in the advanced countries where you're converting what's already there, whether it's real estate energy efficient buildings or electricity generating capacity, there seems to be an opportunity to do the right thing with the incremental stuff coming along in the emerging economies. And solar being an excellent example that you just used.

The issue that's being discussed in international financial institutions is that there are some international support mechanisms that are needed to get capital intermediated to where it needs to be at a reasonable price to get this done. What's your take on that?

JOHN BROWNE

There are of course international financial mechanisms in place, but they can be enhanced. The development banks and international financial institutions all have great potential to direct activity. Most of them, for example, are now completely against developing hydrocarbon projects. But they can support distributed or grid-scale carbon-free electricity generation and transmission projects, provided that someone pays for the electricity. However, when the rich stop feeling rich, they cut back on development spending. We are seeing this at the moment, not at least in my own country where the overseas development budget has been cut back significantly.

MIKE SPENCE

There are challenges then. You've spent a lifetime in the energy industry, you have probably the best knowledge of the range of relevant technologies that are going to be needed to solve this problem. You're going to be investing in promising technologies and promising companies that are bringing solutions that are a critical part of meeting this challenge. So, what looks promising to you? What's coming up? Where are those investment dollars going to go?

JOHN BROWNE

I think that when it comes to technologies, we have probably 70% of what we need to solve the climate problem. Some of those technologies are immature, and have not yet experienced the operational improvement and reduction in cost that come from being rolled out at scale. But most will become part of our future; some will fail so we need more options.

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Wind and solar power generation are clearly mature now. Their costs have come down significantly over the past decade alone – 40% in the case of wind turbines, and 90% in the case of solar generation capacity. And they will continue to get better and better as next-generation technologies like perovskite solar cells come to market.

New secondary sources of energy can also be developed, such as hydrogen. I have no doubt that hydrogen will eventually become part of the energy scene. It is very expensive at the moment, but a combination of incentives, policies and technical breakthroughs will reduce the cost over time and probably quite quickly. Initially I expect most hydrogen will come from reforming natural gas with carbon capture. Later it will come from electrolysis using carbon-free electricity.

Addressing climate change is not just about energy supply; it is about demand as well. If you talked about energy efficiency 10 or 20 years ago, people would roll their eyes, because they thought that the more we save, the more we use.

But this is no longer true. We now have intelligent systems that can do far better than a human in managing and optimizing energy demand. This is about AI and control systems that use data as a basis for future prediction.

There is a tremendous amount which can be done to reduce the absolute amount of electricity that's used.

Then there are natural solutions, places in which we could store carbon that would otherwise be released into nature: forests, land, oceans and a variety of other places. And I'm sure that humans will use their brains to find new ways to produce energy, such as nuclear fusion, in the longer term.

The key point about all of these options is that we do not need to go back to the laboratory and make a breakthrough to get started. We need to go into the field, apply what we've got, and grow it. That's why investing in growth equity, for example, is really the way to go.

MIKE SPENCE

So we've talked about solar, wind, and digital, which are just marching along. I recently read a fascinating book by Walter Isaacson on the development of biomedical science that enabled gene editing. It occurred to me that this might be a fairly important element of the story with respect to agriculture as we look forward on a sustainable basis. Is that something that's in your field of vision?

JOHN BROWNE

Absolutely. One of our Advisory Board members is the CEO of Syngenta. He makes the point that the productivity of basic cereal farming in China is only half what it is in the U.S., because intellectual property concerns prevent farmers from accessing the right types of seeds. If they could solve that, they could begin to create a lot of food with less energy.

This is a recurring theme. Many societies are now asking whether they could do without beef, because cows produce methane and consume a lot of water. Could beef be substituted with plant matter? We are interested also in vertical farming, because of the impact it has on energy and resource consumption.

Methane deserves a lot more attention here because it is a really devastating greenhouse gas. I think the latest data suggests that one ton of methane is equivalent to around 80 tons of CO₂. It doesn't last as long as CO₂ in the atmosphere, but it is much more powerful while it is there. It lasts around 20 years, which is the period during which we have to abate greenhouse gases, because we can't actually remove them. After 20 years, we might have commercially viable technology to remove greenhouse gases directly from the atmosphere. So keeping methane out of the atmosphere over the next 20 years is a really critical activity, which is not yet taken seriously enough.

This raises a broader question: can we decarbonize hydrocarbons? That sounds like a contradiction in terms, but it is the point of carbon capture and storage (CCS). There are plenty of issues to work through, but they are all engineering issues, not fundamental breakthroughs. It's a very important technology, because our purpose is to reduce emissions, not to decide which source of energy is used. We'd naturally like the energy sources with the lowest emissions profile to represent the majority of energy sources, but if we still have some which generate emissions, then we have to take the emissions out. That's the purpose of CCS. It's the purpose of having a forest and keeping it there for 20 years so that it can absorb CO₂, or planting a new one and being sure it's there for a period of time.

MIKE SPENCE

Well, that's a very useful framework. We've talked about reducing the amount of energy we need to run our economies and we've talked about the point you just made, which is we shouldn't decide which technology you should use – the goal is to reduce the greenhouse gases by whatever technique, right?

JOHN BROWNE

I think I would classify activity into four areas. First, decarbonizing the economy, including the decarbonization of fossil fuels for as long as we still use them. Secondly, becoming more energy efficient, because I think we can actually make breakthroughs there. Thirdly, focusing on our resources and not wasting them. The circular economy and recycling is a way to

reduce CO₂ emissions. And finally, managing emissions. That means having assets like forests, making sure we can absorb carbon dioxide and methane, stopping methane reaching the atmosphere, and measuring all of this accurately. I think those four themes cover most of the practical solutions that we can see at the moment.

MIKE SPENCE

The circular economy point that you just made is important, because it illustrates that some of these technologies solve more than one problem in a significant way. If the circular economy is an important element in the climate change story, it's also certainly an important element in various natural ecosystems as well for their survival.

JOHN BROWNE

It is, because everything we make takes energy and energy is the single biggest input to most things. And if we can avoid making it or reuse it again, it seems to me that we really are ahead.

MIKE SPENCE

We seem to have rounded the corner, at least as I see it, with commitment from governments and increasing commitment from new business models focused on purpose and multiple stakeholders and a broader awareness and sense of urgency in the general public. So let's talk a little bit about all necessary players.

JOHN BROWNE

For the first time we can see positive improvements to policies which will take action to reduce emissions. The task is far from complete, and it is easy to be virtuous in your signaling and not very virtuous in your actions. Even so, there has been great improvement. When I first made some big investments in renewables, which was almost all you could do in this space 20 years ago, policy was deeply unstable, and progress was upset again and again by the stroke of a regulator or politician's pen.

“For the first time we can see positive improvements to policies which will take action to reduce emissions.”

The way to solve things is to have an alignment of intent. And I think we are getting there.

When it comes to getting private investment involved, there has to be an incentive or disincentive structure of some sort. I think if you were picking one thing governments could do, just one thing, it would be to price carbon, either through a tax or a bundle of regulations or something else, at a level that made it vital for people to stop producing CO₂. That level is probably at least \$100 a ton. That's much higher than we've seen in any trading system.

There are lots of problems that would come from carbon being priced at that level, especially if we use hydrocarbons to make energy, because the cost of energy would go up for everybody. It would be a very regressive type of impost. Politicians don't like that at all, and I don't blame them.

It remains to be seen whether we can encourage and incentivize three and a half trillion dollars of investment. I think we can in some areas. Europe clearly will do it, and the U.S. is already on track in many areas. China will do a lot on a slightly slower timetable. And there are pockets of activity everywhere. Some of it, of course, is virtuous anyway. If you can save energy, then you're bound to make more profit.

MIKE SPENCE

To emphasize one point you made, because it's crucial: even though it may not be possible to do the right thing immediately because of the shock that it would deliver to the economy, to employment in various sectors and so on, I think that the point you made is not inconsistent with that, and that is you need an understandable, predictable environment for investment so that you don't have volatility and regulations or unpredictability. If it takes us a few years to get there, that's okay provided you've not done too many right and left turns on the way through. Is that fair?

JOHN BROWNE

That's very fair. You make exactly the correct point: a degree of stability is needed. I think everyone in business understands that, on the margin, regulations move up and down as people try to figure out the right way to do things. But big changes should not happen that often. We would all like transparent, well-tuned and stable regulation that is uniformly enforced.

MIKE SPENCE

I think that brings us further naturally to the question of metrics. We've talked about various aspects of this, including problems with the clean development mechanism and the Kyoto Protocols. But talk about the challenge of actually measuring how we're doing, because it's going to be an important feature of the investment programs that you and your colleagues are planning to implement.

JOHN BROWNE

I think there are two things going on here. One is backward-looking, which is the accounting. Investors want to see companies disclosing their carbon emissions, and great strides are being made in this area. It means that with certain assumptions, uniformly applied, you can get "accounts."

The more interesting question is the forward-looking assessment about companies' potential to do things in the future which will increase or decrease their greenhouse gas emissions. Progress is being made here too. There are techniques for setting targets called Science Based Targets, which are set sector by sector and take into account the pace at which a particular company can be expected to reduce its emissions. If you add up all of these targets, they represent what you need to do for the world. Importantly, they do not contradict each other.

These targets help us to take a balanced view of things, which is exactly what we're going to do for every company we invest in. We'll look at the accounting, of course, set a Science Based Target for the company's Scopes 1-3 emissions, and hopefully beat those targets.

That said, there is another "scope" which we're going to include in our assessment. We're calling it "Scope 4" emissions reductions, and it goes beyond net zero. For example, if you produce a battery and that is all, there are no greenhouse gas reductions. If anything, they may be increased during the production process. But people who use the battery in their product instead of burning hydrocarbons are going to save a lot of greenhouse gases. The same is true of a software system. The software itself doesn't produce much CO₂, but what it really does is change the whole supply or demand dynamics in somebody else's activity. So we will take this into account when measuring our impact on greenhouse gas emissions.

I think this is a very difficult area to get right. I believe that to have credibility, you need to have an independent assessment of what you're doing, because it's too easy to mark your own homework. And so that's also what we're going to do as we invest. We have to have independent verification.

MIKE SPENCE

I think this is really important. And to be honest, it sounds complex keeping track of these second, third and fourth order effects, supply chains, etc. And there's a cast of thousands out looking for leakage, but let me ask you, are there credible, well established independent outfits that perform top flight measurement services?

JOHN BROWNE

Yes. They have responded primarily to investors struggling with ESG. It started with Governance as ISS, Glass Lewis and others as they started to push companies on executive pay, directors' independence and so on. And then it migrated to Environment, but more focused on pollution of water or land, which are easier to track. And, of course, Social, which in my mind is absolutely critical, which is why I have been involved in particular with LGBTQ+ rights. This is about the human rights of employees and the impact of companies on the rights of others. We can see that developing before our very eyes as people think through the meaning of equity, diversity and inclusion.

There is now a big move towards auditing ESG and I agree with that. All our portfolio companies should absolutely be improving their ESG performance.

In addition, there are some organizations which now specialize in Science Based Targets and forward-looking assessments, and we've made a joint venture with one of them. This is itself a very interesting investment area. How do you find this data and manage it? How do you make it simpler?



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MIKE SPENCE

It's a growth area. So the bottom line is, I think, that you feel that a significant fraction of the world's businesses are in the process of transforming and this creates multiple opportunities for investment. How are you going to look for them?

JOHN BROWNE

You could say that our investment universe is the whole world, because this is not a “vertical.” It's a “horizontal” activity. So we are going to look for opportunities in four very specific areas: decarbonization, energy efficiency, resource conservation and emissions management. One of the best ways to find opportunities, of course, is to have people who have been involved in the industry, who know people who are doing these activities, and who bring ideas and deals with them. I would say that the six people we've recruited so far – four managing directors and two principals – will do just do this.

In addition, we are a companion venture of General Atlantic, which has a well-honed technique for sourcing opportunities.

MIKE SPENCE

So it's broadly consistent with what General Atlantic does in a different set of territory. And why did you choose the name BeyondNetZero?

JOHN BROWNE

Because we meant it, and we want to go beyond zero. I think all of us realize that reaching net zero is very important in the next 20 years or so, when we have to find ways of stopping forests being destroyed, giving credit for the financing that keeps them there, and finding other physical and financial mechanisms to offset CO₂ emissions. But we have to go beyond that eventually. There will come a point when we have to remove CO₂ from production, distribution and consumption.

Conceptually as well, I think we have to think “beyond” net zero in order to achieve net zero. In my experience in business, unless you strive to go beyond, there is no chance of hitting a target, because behavior is about stretch, inspiration and aspiration. That's why I thought that BeyondNetZero was the right name here. I think it fits well with GA, which is trying to invest its money beyond today, not investing in past technologies.

MIKE SPENCE

In the end, I think some of the achievement of these goals again on a global basis is going to depend to some extent, not just on very smart, properly built companies with important solutions for elements of the problem, but on values, because values will affect regulatory behavior and will affect individual behavior.

JOHN BROWNE

You're absolutely right. Solutions to these big problems won't come simply from getting all the technicalities right. They are decisions made by humans based on values. And I think the decisions get better as we collect more and more evidence.

Our aim is to do something which makes it possible for human beings to live on this planet without destroying livelihoods and the places in which they live; without removing a lot of coastal areas or creating barren land where you can't grow things anymore. We are in the business of preventing that from happening. That's a very high challenge. We must not lose the plot here. The plot is to reduce emissions, in the pursuit of protecting human existence.

MIKE SPENCE

John, are our governance systems, whether they be corporate or government, capable of solving a problem on these long-time horizons or are we just going to keep cycling into the short-term?

JOHN BROWNE

We do respond quite well to existential crises. I think we've learned something from COVID-19, a real global threat. We responded in an extraordinary way. We set to one side economic growth. We said, "It's about people, it's about all those deaths and we've got to stop them." So we can do it. We just need to keep reminding people that if we don't solve this problem, we will have bigger things to worry about than economic growth.

I often thought that the use of the phrase "climate crisis" was the wrong terminology. I now think it's the right terminology. But critically, it is a crisis with solutions. We know how to do this. We just must not lose the plot and we must make sure we keep consistently applying our knowledge and abilities for the benefit of humanity.



General Atlantic is a leading global growth equity firm with more than four decades of experience providing capital and strategic support for over 400 growth companies throughout its history. Established in 1980 to partner with visionary entrepreneurs and deliver lasting impact, the firm combines a collaborative global approach, sector specific expertise, a long-term investment horizon and a deep understanding of growth drivers to partner with great entrepreneurs and management teams to scale innovative businesses around the world. General Atlantic currently has over \$65 billion in assets under management for its growth equity mandate as of March 31, 2021 and more than 175 investment professionals based in New York, Amsterdam, Beijing, Hong Kong, Jakarta, London, Mexico City, Mumbai, Munich, Palo Alto, São Paulo, Shanghai, Singapore and Stamford. For more information on General Atlantic, please visit the website: www.generalatlantic.com

