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‘New gas power plants may delay the transition’: Patricia Darez, 350renewables, Chile

Patricia Darez is the director of 350renewables [1], a renewable energy consultancy based in Chile. UK-educated, she has over 15 years of experience in the energy sector, and between 2017-19 was Chile country manager for DNV GL, offering technical advice on wind, solar, hydro, geothermal and thermal projects across South America. In this interview with Gas Matters, she discusses the problem of renewables curtailment, which is caused by transmission bottlenecks, in Chile and beyond, the importance of amending regulations and better grid management to address the issue, and the role natural gas can play – “ideally with an end date,” she notes – in balancing variable renewables.



[2]

Can you outline what's happening in Chile in terms of why we're seeing these higher renewables curtailment rates?

Transmission follows development, so it lags behind the projects in most markets. European markets are more developed and more compact than most of the markets in the Americas, which geographically have huge expansions of land and wilderness.

In addition, Chile is particular in that it has very open access to the grid. This means curtailment is shared equally, on a pro-rata basis, among all projects that are connected. Projects develop at different rates and points in time. But the first projects that connect do not have the same baseline information as the ones that connect later – you know how many are in front of you but can only guess how many will be behind you. Furthermore, if you have a lot of PV (photovoltaic) projects they will all want to inject at the same time, which is when there's sunlight, unless they have storage.

What I think would be the logical way of dealing with it, and many markets deal with it this way, is via the principle of last-in, first-out. So, for example, if you are the fourth project, you knew that there were already three others connected there and that they would have priority if there was curtailment. Then you can make an informed decision with that baseline and decide if you do want to connect.

In Chile, however, it's shared as a pro-rata of your capacity, regardless of your place in the queue. And what this does is it allows players that have a broader back, and maybe those with bigger or more diversified portfolios – typically those with more expensive and older contracts and fossil fuel technologies – to take advantage of the situation. The market rules effectively allow for somewhat unfair competition.

For the established players, the portfolio effect and higher price contracts help to insulate them even if they make little or no profit from some of their plants for a while. Whereas the newcomers may only have the lower price contracts. When they inject they may only sell at very low prices on the spot market and have to buy expensive energy at a different node to fulfil their distribution companies (DisCo) tenders.

If you also cannot inject for 30% of the time, even if you were one of the first projects connected, that can have a big impact in your financial model – more than anything because projects often are backed by project finance, which means they need to pay back and also pay their operational costs.

So, we end up in a situation where market concentration may happen. Some players are offering to buy projects that are struggling and when you end up with fewer players, there is naturally less competition.

Do you think the planned Kimal-Lo Aguirre high-voltage direct current (HVDC) transmission line is going to solve the curtailment problem in Chile?

For sure it will temporarily get better after Kimal-Lo Aguirre enters into operation in 2030 to 2032 – more likely in 2032. But amending the regulations could help to better preserve the market conditions under which the investment decisions were taken by respecting your place in the queue and regulating the open access more.

“ *Renewables curtailment is the new normal once you deal with a lot of variable resources like PV and wind.* ”

There is a big pipeline of projects coming in. Decarbonising an electrical matrix, and potentially more, requires more renewables projects. There are other big things that can help with the curtailment situation but they require a real paradigm shift – not a technological shift, the technology is here. It's how we manage our grids that matters.

Firstly, to increase the demand for electricity and to try to use the demand as an asset for flexibility. But that does require a reform of the distribution sector and investment in distribution infrastructure. It's not just renewable generation that is variable. The demand is also variable and the market is likely to change profoundly as we electrify transport and have a lot of batteries available in distribution – from electric vehicles or consumers, for example.

Secondly, we could make more efficient use of current transmission infrastructure, which is possible without compromising reliability via automation, relaxing the N-1 criteria, introducing more storage as a transmission asset and others.

Curtailment is not suddenly going to disappear. This is the new normal once you deal with a lot of variable renewable resources like PV and wind. You can also invest in 24/7 renewables like CSP, geothermal, hydro, pump storage, BESS and so on, which give you a more flexible approach but cost more.

You mentioned at the beginning that you felt Latin America has more of a problem with transmission than some other regions of the world. Could you say more about why that may be the case?

Because Chile is around 4,250 km long. The UK, for example, isn't like that. There the grid extends more evenly in all directions, it's a lot more populated. The distances are smaller, so it's just a smaller place with a lot more lines.

The distance thing is not easy to get away from. Brazil is huge. Brazil is luckier in that, due to its shape, it has more of a star-shaped grid, whereas Chile has more of a narrow line-shaped grid. And obviously Brazil is connected to other countries.

Chile has the Atacama Desert in the north, it's connected to Peru via only a small line. The connection with Argentina is difficult because there are the Andes in between. So, there should be more connections between countries, they should share more, but that doesn't get away from the fact that there are huge distances involved and fewer lines.

And less population density as well. If you have a look at the density of the UK or Germany versus Brazil or Chile, you'll see that it's pretty obvious why there's less density of lines. In the end, electricity is produced for people and if you have less density you'll have fewer lines.

Obviously your experience has been with renewable energy. How do you view the role of gas in the energy transition?

In theory, it should have a positive impact. In practice, I have seen examples like the inflexible gas in Chile that make me more wary. So, what should gas be used for? It should be used as a temporary – ideally with an end date – measure while you’re doing the energy transition. It should be used for displacing coal and diesel and for balancing variable renewables so that more of them can be integrated within the mix.

“ *Gas is there to balance variable renewables and displace coal or diesel.* ”

There’s a big case in Chile with the tribunal for market competitiveness because there was a section in the legislation that allowed gas generators under exceptional circumstances to inject their gas, jumping the whole order of dispatch and artificially reducing the spot prices while displacing renewables.

This happened with no compensation to any of the affected generators that were unable to inject their energy. And at times more than 60 or 70% of the gas that was injected was declared as inflexible. Most people understand that if something happens 60 or 70% of the time, it’s not the exception: it’s the rule.

Is that because gas has no place in the energy transition? No, but we have to be careful that it is used appropriately. Gas is there to balance variable renewables so that we can integrate more into the mix, gas is there to displace coal or diesel.

The moment it starts displacing anything that is not coal or diesel, or the moment we lock in infrastructure – so, if you build now a new gas power plant, you’re going to have to have it operating for a number of decades and that may well delay the transition.

This paradigm shift, from a hydro-thermal electricity system to a renewables-based system does require that we are a little bit uncomfortable and that we find solutions. Otherwise, we will try to go with the path of least resistance – and that is continuing to use fossil fuels, which has dire economic consequences, not to mention environmental ones. And that’s where I think the danger comes in. Gas has a place in the transition but it needs to be used appropriately.

You mentioned the use of gas for balancing the grid. Batteries to a certain extent could perform that function, although their duration is one of the factors that is an issue. Do you see batteries reducing Chile’s demand for gas, perhaps over the next 10 years?

Batteries can take part in that role. This is a complicated question because you refer to duration, but you can just use more and more batteries – it’s a totally scalable technology. The question is, how much that’s going to cost and at what point it stops making sense.

With gas, we have a situation where it’s externalising a lot of costs and it’s not paying for them. At what point does this balance out – should there be a carbon tax? I don’t know, but if we look at how much it costs today to remove one tonne of carbon from the atmosphere, it’s several orders of magnitude bigger than the carbon tax in virtually all countries.

And therefore, is it cheaper to use gas than batteries? It depends on how much you dig deep into the details. It requires looking further than what the legislation says and looking at the externalities and the

big picture. The current economic or regulatory frameworks are not doing this right now.

“ *You can be a less developed country and have strong institutions and a trustworthy framework.* ”

We should consider on a global scale how much it costs us to put that carbon in the atmosphere. Gas is better than coal. At least on paper, it has fewer emissions associated with it. But it's still emitting CO₂, and not just what you burn but the process of extracting it emits methane.

Chile is perhaps the country that's advanced the most in Latin America in terms of its plans to produce green ammonia and green hydrogen. Given that Chile is already struggling with transmission, what impact are those plans going to have on transmission requirements?

I don't think that necessarily has to affect transmission: this is going to affect the amount of renewable electricity that we need. We know that if there's a green ammonia or green hydrogen industry, you're going to need a lot of renewables – orders of magnitude bigger.

Just to substitute the diesel consumption of mining companies in two mining regions of Chile, you need to double the amount of renewables that you have installed in the whole country.

The second thing is, what are you going to produce? And how are you going to carry it? You don't need to move that electricity far. You could have the business model where you have the renewables and the electrolyzers in the same place and not have to move any electricity. And then what you need to move is the green ammonia, which you can do via pipes, for example. For the green hydrogen I'm not sure how they're going to do it but that's a different story.

Potentially, you could make a deal with the different PV plants in certain regions of Chile that are being heavily curtailed to obtain cheap electricity and literally just make the demand for electricity on-site.

And that's positive. That means that instead of throwing energy away, which is what we're doing at the moment because there's no capacity to carry it elsewhere, what you do is you use it for producing something else ideally on-site or near the site. It would not make sense to have lots of PV plants in the north but then to make green hydrogen in the centre or the south of the country. I think you're going to place the industry where the renewables are.

Finally, there is an argument that renewables and the need for accompanying transmission puts more of an emphasis on planning, governance and the institutional capacity of each Latin American country when compared to oil and gas production. Do you think this could impact which countries in the region will continue to use a higher share of hydrocarbons?

I do think that stronger institutions definitely help to make an easy transition, for sure. Because it does require regulation, it does require fair rules, it does require changes and adjustment to the rules constantly because what you're doing is moving away from what was there. And, yes, 100% it is easier if you have strong institutions which are backed up by trust.

Although I would try not to equate strong institutions with development. You can be less developed and have strong institutions and a trustworthy framework because I do think it also has to do with the

philosophy and the will of the general population and how they think about the energy transition.

So, I don't want to make it too simplistic, but clearly strong institutions and trust in them and their processes help to make a smoother transition and to make clear rules and to bring investment. - EO

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