Enabling solar as a primary energy source

Solliance Day

Yuri Sebregts

EVP Technology and Chief Technology Officer Shell

January 28, 2021

Yuri Sebregts speech at Solliance Day

Yuri Sebregts leads a global Technology organisation of more than 3,000 people, combining technical, scientific and commercial expertise. These teams are based at Shell's major technology centres in Amsterdam, Houston and Bangalore, and at smaller technical centres located close to Shell's customers and partners.

Yuri is responsible for Shell's technology strategy and new technology development, as well as external technology commercialisation activities. These range from research and development programmes delivered both in-house and through collaborations with external partners, to deployment of technologies across Shell's operations, as well as catalyst manufacturing and sales, and technology licensing and technical services to third parties.

He also oversees the company's digitalisation activities to apply proven and new digital technology solutions to Shell's existing businesses and emerging new business models.

Yuri joined Shell in 1991 and has held various technical and commercial positions in Europe and the USA, including Chemicals, Lubricants and Refining.

He is a board member of the MIT Energy Initiative, Stanford Global Energy Council and the Dutch ECN/TNO Strategic Advisory Board. He has also been invited to address high-level forums and industry conferences, including the Web Summit, CERAWeek and World Petroleum Congress.

Yuri was born in The Netherlands and completed his MSc in chemistry at Leiden University before joining Shell.

We live in extraordinary times. The COVID19 pandemic has disrupted and reset the world in every possible way. As the world emerges from this unprecedented crisis, society must remain focused on the longer term challenge of climate change. Yuri Sebregts talks about how a company like Shell can contribute to making solar photovoltaic a key part of the energy transition.

Thank you for the introduction. I'm delighted to be here with you today – albeit virtually. I look forward to the times when we can be physically in one place again for these kind of events, hopefully soon.

Collaboration in times of change

I think we can all agree that we live in extraordinary times. The COVID19 pandemic is the greatest health challenge of modern times. It has disrupted and reset the world in every possible way.

Collaboration has been key to battle the pandemic.

It is through collaboration that we now have a vaccine, it is through collaboration that countries are able to coordinate efforts and it is through collaboration that innovative healthcare solutions are being developed and deployed.

As the world emerges from this unprecedented crisis, society must remain focused on the longer-term challenge of climate change, which has not gone away.

The world still needs to change to a cleaner energy system, if we are to provide for the growing energy demand for human development, while preventing catastrophic effects of climate change. Collaboration will be key to achieving this, like it is key for battling the pandemic.

As a society, we need to keep global warming below two degrees Celsius, and ideally below 1.5 degrees Celsius. That means society needs a net-zero emissions energy system.

A company like Shell has a choice: produce oil and gas with the lowest possible emissions until they are no longer needed, or it can say: "if society needs to get to net-zero emissions and we want to be an integral part of that society, then we need to get to net-zero as well."

Shell has decided to go for the second, bigger mission. Having worked for Shell for almost 30 years now, I'm proud that we made that decision.

I am not a specialist in the science of solar photovoltaic, but I can give a view on what an industrial company like Shell can contribute to making solar photovoltaic a key part of this energy transition.

Shell's net zero emissions ambition

Shell's ambition is to be a net-zero emissions energy business by 2050, or sooner if possible. We will work towards this in three ways.

First, we aim to be net-zero in how we make our products; in our own operations.

Second, we seek to significantly reduce the carbon intensity of the energy products that we sell to our customers.

For example, this means developing new types of biofuels and making them commercially viable; or developing hydrogen for heavy-duty road transport and as a storage solution for intermittent energy; and carbon capture and storage for heavy industry.

It also means selling large amounts of renewable electricity – and solar has a role to play there.

According to Shell's Sky Scenario, which illustrates a technically possible but challenging pathway for society to meet the Paris agreement goals, the global generation of electricity would need to reach a level nearly five times what it is today by 2070.

"If society needs to get to netz-zero emissions and we want to be an integral part of that sociey, then we need to get to net-zero as well."

Also by 2070, you would have around 45% solar and wind in the energy mix of primary energy sources.

Solar would be the fastest growing and lowest cost renewable electricity source in that scenario, made possible as photovoltaic technology is continuing to evolve and manufacturing costs fall.

The third way in which we aim to reach our net zero emissions ambition is that we help customers in sectors that use energy in ways that are difficult to electrify, like aviation, heavy industry and long-distance freight, to find their own path to net zero.

Our ambition will require working together with others in a way, and at a scale, that we have not seen before.

This transition requires collective action across the energy system – from lifestyle choices made by customers, to radical innovation in supply chains and business models of companies, and policies that support decarbonizing economies by governments.

At Shell, we are making progress towards these changes.

Today, I would like to touch on a few examples of how Shell is doing this: electric mobility, electrifying industrial processes, green hydrogen projects, our activities in solar and lastly how we are providing access to energy.

E-mobility

One of the ways that Shell is transitioning to a low-carbon energy future, is investing in the future of electric mobility, or e-mobility.

E-mobility from renewable energy is an important and growing part of Shell's business.

In 2019, 7.2 million electric cars were on the road, up from just 17,000 in 2010. And this is predicted to rise to 220 million by 2030. And 0.5bn by 2040 – 1/3 of all vehicles on the world's roads.
For electric vehicle use to grow more rapidly, drivers need to be confident that they can recharge at their convenience when they are travelling.

We are addressing this concern by providing drivers access to a large and growing network of reliable charging points.

We offer more than 165,000 charge points around the world. As one of the largest providers of electric transport solutions, Shell will continue to grow our charging network.

However, Shell cannot drive the e-mobility revolution on its own.

Cross industry partnerships and collaborations with policy makers and consumers are needed to develop the technology, regulations and infrastructure that will make electric mobility more sustainable, cost-effective, convenient, safe and reliable.

Electrifying industrial processes

While the personal mobility sector is relatively straight forward to electrify, many industrial processes are dependent on fossil fuels, and cannot be electrified at all, or only at a very high cost.

Practical alternatives have yet to be developed, and innovation rather than deployment is currently the focus.
That does not, however, mean energy companies like ours cannot have a big impact.

We are taking on this challenge at Shell and collaborating with others to find innovative solutions.

For example, we are working together with Dow to accelerate technology to electrify ethylene steam crackers.

As most of you will know these produce the basic building blocks for all kinds of products that people use every day.

Today's steam crackers rely on fuel combustion to heat their furnaces, making them CO2 intensive.

Using renewable electricity to heat steam cracker furnaces could become one of the

"Solar would be the fastest growing and lowest cost renewable electricity source in this scenario, made possible as photovoltaic technology is continuing to evolve."

"The transition requires collective action across the energy system."

routes to decarbonize the chemicals industry.

The challenge is to develop a solution that is both technologically and economically feasible.

We are working to first design process technology innovations to be proven in laboratory and pilot operations, and to then scale to commercial crackers.

Green hydrogen

For sectors that are difficult to decarbonize, such as high-temperature industrial processes, long distance transport, and aviation, electricity from solar and wind power only is currently not sufficient, or not feasible.

Green hydrogen may be a good alternative to use wind and solar energy on a larger scale.

Using available technologies, hydrogen is relatively easy and safe to produce from renewable energy such as solar and wind, and can be stored in larger quantities, unlike electricity.

Shell sees opportunities across the hydrogen supply chain, including the production, storage and shipping of hydrogen, as well as end-customer solutions.

Shell, together with its consortium partners, Gasunie, Groningen Seaports, RWE and Equinor, announced a year ago one of the largest green hydrogen development projects in Europe, the NortH2 project.

Located in the north of the Netherlands, the project looks to construct wind farms in the North Sea, which can gradually grow to a capacity of about 10 gigawatts by 2040.

The first turbines could be ready in 2027 and will be used for green hydrogen production that will mainly be used to supply the industrial sector.

The plan provides for a large electrolyser in the Eemshaven, that will convert wind energy into green hydrogen.
In another project, Shell is also working to create a green hydrogen hub in the port of Rotterdam, at the Tweede Maasvlakte using green electricity from wind power that will come from the Hollandse Kust (noord) offshore wind farm built by The CrossWind consortium, a joint venture between Shell and Eneco.

Instead of hydrogen, another option is to store renewable energy in fuels like synthetic kerosene, a concept often referred to as solar fuels. It utilises renewable energy to convert CO2 and water into hydrocarbons.

In our technology centre in Amsterdam, we are developing solutions to make this commercially viable at industrial scale.

This may be an important development for the aviation sector, as this is one of the most difficult segments of the economy to decarbonise.

Solar portfolio

In addition to growing our offshore wind portfolio with projects like the ones I just mentioned, we are also actively building our global solar portfolio.

Primarily through our partner companies Silicon Ranch in the US and Cleantech Solar in Singapore, we have more than 240 solar farms in 12 countries in our portfolio - generating enough to power more than 1 million homes.

In 2019, we acquired the German company sonnen, which gives residential customers a smart system that allows them to generate energy through solar panels, store it using onsite lithium ion batteries, then supply it to their own homes in the most efficient way.

Sonnen is expanding operations in Germany, Italy, Austria, Australia and the US.

The sonnen system incorporates active energy management with smart metering to discharge stored energy when it is needed. It also allows sonnen users to draw on surplus energy stored in other sonnen homes.

For instance, energy stored while one homeowner is on holiday, can be

"Shell sees opportunities across the hydrogen supply chain, including the production storage and shipping of hydrogen, as well as end-customer solutions."

discharged back into the grid and used by another sonnen homeowner, who may need more to charge their new electric vehicle.

We are also increasingly using solar power at our own sites and operations.

We have a solar park in operation at the Shell Moerdijk Chemical Plant here in the Netherlands. With 76,000 panels, the solar park has a peak capacity of 27 megawatts, equivalent to the energy consumption of 9,000 Dutch households.

The generated solar energy is used to help power operations at Shell Moerdijk.

And just last week, we announced that Shell will start the construction of the 30 peak megawatt solar farm Sas van Gent-Zuid in March.

This solar park is a unique redevelopment of a former industrial site.

It has a relatively large capacity, that contributes significantly to the sustainability goals of the municipality of Terneuzen.

The Shell solar park will be built on land of over than 24 hectares: that's about 36 football pitches. The more than 55 thousand solar panels will generate approximately 30 gigawatthours per year and result in a CO_2 reduction of almost 17 thousand tons per year.

We have other solar parks in the Netherlands: one in Heerenveen (14MW) – now operational and one in Emmen (12MW) – operational soon.

Access to energy

We are also involved in off-grid solar systems.

Globally, nearly 800 million people still lack access to electricity, and hundreds of millions more have an unreliable supply.

Shell wants to help people gain access to the benefits of electricity and – in line with society's expectations – from cleaner sources.

That's why we have the ambition to deliver a reliable electricity supply to 100 million people who do not have this today, primarily in Africa and Asia, by 2030.

To achieve this, we are investing in companies that deliver innovative off-grid, or distributed, energy access solutions, like solar, with the potential to be developed on a larger scale.

For example, we have a minority investment in Husk: a leading mini-grid company with more than 50 sites in India and Tanzania.

Husk deploys hybrid mini grids with solar photovoltaic as the primary source, battery storage, and biomass gasification as the backup system.

The mini grids provide customers with reliable and affordable electricity 24 hours a day, on a pay-as-you-go basis.

The company serves a mix of rural households and small businesses.

In closing, notwithstanding the humanitarian and economic crisis we are currently in, we must continue to take action to move to a cleaner energy system.

In this, we all have a role to play.

Shell's ambition is to be a net-zero emissions energy business by 2050, or sooner if possible.

We cannot do this alone. Our ambition requires working with others in a way, and at a scale, that we have not seen before.

Let's make the future, together.

Thank you.

"We have the ambition to deliver a reliable electricity supply to 100 million people who do not have this today, primarily in Africa and Asia, by 2030."

For information about Shell, including downloadable versions of these speeches and other publications, please visit www.shell.com.