

Our guest today is fondly known as the Batterywali of India. Dr Rashi Gupta, Founder Director, Vision Mechatronics has pioneered the manufacturing of advanced lithium batteries and made herself a name to reckon with in the field of renewable energy and energy storage.

Named Asia's most influential woman in renewable energy, Dr Rashi advocates for gender equality and women empowerment at every possible opportunity.

She is a committee member of the Bureau of Indian Standards for batteries, energy storage, and e-mobility, a member of International Electro-technical Commission and the list goes on.

Through Word to the W.I.S.E, we will continue to build on our legacy: driving transformative change in pursuit of a safer and more resilient society by inspiring more young women to a career in the field of STEM.

Remember, you too can nominate more remarkable women to be part of the show. Or just send in your questions for future guests on the Word to the WISE podcast.

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You can also **read** along as you **listen** to the Word to the WISE host *Shivraj Parshad* in conversation with *Dr. Rashi Gupta*:

Host: Dr Rashi Gupta thank you for joining me in this conversation on the Word to the WISE podcast. How does it make you feel being known as the Batterywali of India? And more importantly, can you tell us a bit about why you came to be known as the Batterywali?

Dr Rashi Gupta: Thank you so much for giving me this opportunity here today to be with you on this podcast. Well, how do I come to be known as Batterywali of India? Now this happened because I'm one of the pioneers in this segment and being a female, only female entrepreneur in a domain, that the tagline as Batterywali of India. And, you know, being the pioneer, there were not many people. When in 2015, when we started with advanced lithium batteries in India and, you know, in India, there's always a wali or wallah tag attached to your work. So that's how they describe your work profile. And then it was easier for people to just see and relate, you know? Okay; Go to Batterywali, that female who works in batteries. She'll tell you what is to be done. So, so that's how it came and and then I took it as a tagline for me as a respect and affection given by the industry. So, I said, why not adopt it?

Host: And that's in good spirit. But before we get into your work and views on the role of women in science and engineering, can you Dr Rashi, give our listeners a sense of where your love for the sciences began.

Dr Rashi Gupta: Well, right at the childhood. My love for science began right at the childhood. You know, as a female, my parents never gave me dolls, playing materials with generally girls get, I always got a computer to play with, so I was the one who was playing PC man and Pacman, at that time, And I was always into computers and you know, more things with innovation would fascinate me rather than, you know, get into the traditional. But at the same time, my mother did strike a balance to ensure that I could do everything at home. I mean, all the household chores is something that I can still do. So, you know, that was something which was fascinating. And I'm very thankful to my family, that they could allow me to take a science as a background and they always encouraged and said it's fine, you can take up science and then it really fascinated me a lot. I would love doing those experiments, I would love seeing how computers would work. In fact, when I created my first email ID I was so excited. We had those old modems in our house at that time, you know, those 144 kbps those white colors small models which would work. So that internet would give me such a big exposure to more technology and it would connect me to the world to read more and understand more. So, it goes way back to my childhood.

Host: That's so interesting. And why renewables? More specifically energy storage and lithium batteries

Dr Rashi Gupta: Why renewables? I tell you what I mean. I started in 2009 with robotics and my plate was full very soon because of the kind of work we did, very niche, very advanced. And then I was like, okay, now I'm getting stagnated. I feel stagnated. How do I give my brain some challenge to really create, innovate? Because it was on an autopilot mode for 3, 4 years. Next 3-4 years. So, what do we do? So then renewables did catch my interest. because that's where, you know, energy and power comes into play. And I loved power, somehow. It was very important for me to give back to the society at large because the society has given me a lot. So, I wanted to give back, contribute my bit. And that's when I started looking into renewable energies, but then solar was by and large, quite a lot saturated in other countries, in the more developed countries and energy storage was picking up. But then India had been always a traditionally lead acid battery storage country till then, and I wanted to give it something new, a new flavour. And that's when I came across that people abroad are getting into lithium batteries. You're getting into more advanced technologies and why India should not get into it? Why should I not bring something which is more valuable, which can change the way energy storage is perceived. So that's when I thought, okay, lithium makes more sense. It is more beneficial to what India really needs in terms of overhauling, in terms of giving a new face to the entire, power sector.

Host: And you've often said that at Vision Mechatronics, you want to develop the world's smartest lithium battery in India. How far have you come in achieving that vision?

Dr Rashi Gupta: Well, absolutely because I always thought that smart work is more important and it makes more sense. So what we did was we wanted to add IoT. That was our first thing, so that, see, you know, India is geographically, a very large nation and traveling and for service support, it becomes really difficult. At times, going, reaching rural places and you know, far to reach places. So I thought, why not add something intelligent? Give a battery on a next level of

interaction. Wherein, it could interact with the client, it could interact with us and it would give you much more advanced prediction on things. So yes, we made it smart and not just smarter, we made it the smartest, and we are continuously adding to it. Today we have added a preventative and predictive monitoring, where we can predict 15 days in advance that the cells are going to go bad. We are now going to, with all the data that we are collecting with every instance in every day, we want to make it to at least 3 months in advance. So, you know, we are going to continuously improve what we are doing in terms of product, in terms of service so that the customer has a complete peace of mind. So that is what something I felt is very, very important in terms of having a service and a smarter service, because smartest thing is something which is very new and and internet and IoT has given you a very, very broad spectrum to improve your service and the customer satisfaction. Take it to the next level.

Host: And how important is that from a safety and security perspective?

Dr Rashi Gupta: Very, very important, you know, because safety plays a major role and many a times you can avert many accidents having IoT in the picture. We are also going to add blockchain to take it to the next level of transparency. But what I realized is, you know, by having preventative and predictive monitoring we were able to solve many issues just remotely with very minor changes. And what we could understand is, you know, we could give it a better efficiency to the customer on site, by understanding the usage patterns. So safety is paramount. We have not compromised anywhere on the safety. We are trying our level best to keep on adding to the safety that is required in terms of the internet of things in terms of the battery technology per se. So we are doing both over there. We have that as a reason, introduced a very advanced BMS System, which takes care of most of the things, including an active balancing to give it a very high efficiency. So these are the things on every level we are trying to inculcate so that the customer has a seamless zero blackout experience.

Host: And as you pointed out, Dr. Rashi, India is a very vast geography. There's rural India. There's urban India. There's semi-rural, semi-urban where do you go from here?

Dr Rashi Gupta: I think it's important to uplift the rural India. Till now on the development, we have focused only on the urban India. Or rather the semi urban, we are now developing the semi-urban India. But I think it's time that we focus on rural India because you know, there's a lot of energy drain happening. And the urban India is not capable of sustaining this energy drain any further. The urban India is overloaded and overburdened. So if we could shift the entire development focus to rural India in terms of power, in terms of energy, in terms of manpower, in terms of people, I think the whole country will be developed very fast.

Host: And you've been viewed as a very important voice for gender equality. How important has that become for real advancements in the field of applied sciences in engineering, where you're looking like you just pointed out to solve the real problems of today?

Dr Rashi Gupta: I think gender equality is very important and in the sector that we are, women are actually a very big beneficiary segment of the power requirements that we are looking at. And women in STEM are also equally important. I mean, ground reality is that we really don't

see many of them taking up applied sciences or engineering. So we need to focus on that as well. And it is important that whatever we are doing, as in our product enhancement or a technology enhancement, it should be gender neutral. It's very important because if you see, most of the times we have men representing most of the technological sector. So they think in that fashion, they think alike. Now we need to balance the whole idea by having a gender-neutral approach. I mean, most of the courses also, if you see they are more masculine in nature. Can we have a gender balance out there to create courses which are equally balanced have some feminine nature and have a masculine nature as well. I mean, this is very specific to the engineering segment. The STEM segment. I mean, if we can do that, we can really bring a lot of balance in the ecosystem. And I think that would create more opportunities for gender equality as well as for companies to grow.

Host: And just sticking with that theme, in the past year or so, the spotlight has clearly been on women in STEM. We've seen industry bodies, government, the media, all talking about the changing dynamics, the need for greater advocacy funding, so on and so forth. But when it really comes down to ground realities what do you think needs to change or what do you think will make a real difference, especially in your industry?

Dr Rashi Gupta: Well, yes, you're absolutely right. That the spotlight has been on women in STEM, but something that we really need to do is at the ground level, we need to work at the grassroots level, right from, you know, for the girls where they are in their mid-school, like 10 and 12 standards and, you know, going into the early colleges. At that time we need to focus and we need to bring them to have a sense of comfort that yes, engineering is for them and not just, you know, software engineering roles like computer sciences and electronics, even deep core engineering like mechanical or electronics or civil is okay for women to take up. Like mechatronics. All these, all of these things can be taken up by women or the girls, and they can really excel in doing it. It does not have to be a male dominated or a male oriented kind of course. So we have to break these stereotypes; 'women only are good for the softer roles like teaching or the fashion industry or the music industry'. I mean many more on the softer side. I mean, these are some examples I am citing, please don't stick to them. But the point is here, that we need to make sure that we can equally do well in the hardcore main STEM and engineering fields. It's not difficult. It's just that you have to believe in yourself, that you can do it. And you know, something important here is that the mothers play a very vital role in their upbringing. And the parents, rather just not mothers and fathers both, you know, together. They have to allow the girl to really believe in herself and push her that yes, you can do it. There is nothing impossible when you say impossible, it's like, I am possible. So yes, you can do it. It's not difficult. It's achievable. And then, you know, we inculcate that faith in that young child's mind; that it is possible. Then I'm very sure we will see more and more women coming into the industry at higher level, higher roles. I mean, after MSc or BSc, or maybe in physics or maybe the final year engineering, you don't see many girls continuing with those in their careers ahead. Or math for that matter. We don't see people continuing with their careers, there is a break after that, then they get married and then all the other things keep happening. So the family takes precedence. Or, the family gets more importance over the career. but then it's okay. It's okay. I mean, women can be in STEM. They can always have a second career to begin with and it should work for them. So we need to inculcate things in the grassroots, at the same time,

colleges, schools, and the universities also have to start bringing up courses and making the females and the girls more comfortable on such, topics. They should be allowed to take those challenges openly and they should be treated equally. I mean, don't just because there's a girl student coming in, don't give her an extra advantage. Treat her equally as a male counterpart, and you will see that she will excel or perform in the same fashion as the other students are doing. So that I think is very important.

Host: And just coming back to focusing on you. how do you see yourself being part of that change?

Dr Rashi Gupta: Well, I'm trying to do my bit really. I mean, I'm trying to, wherever I get an opportunity, I'm trying to be a part with all these universities, technical Institutes. Trying to mentor students or young women and men, both, I mean, young minds so that they can come up in the field of STEM. The whole ideology is to give them a practical experience to make them understand that it's not the books that only will give you everything. I mean, it's just a degree on the paper. That's not going to help you. You have to come to the ground reality. You have to come to the shop floor. You have to come to the labs you have to experiment yourself. See how important it is to do things yourself. You know, that is what I'm trying to build. And so I am trying to help. We do give a lot of internships to, uh, to the young students so that, you know, they can come they can experiment, they can learn how industry functions. They can understand where is the gap between academia and industry. Come on the shop floor. See how things work and see the change that you feel in yourself. And then you can always, you know, when, when you have experienced that change, you can always help others change.

Host: And your example is out there, you know, interestingly, your innovation with lithium based battery systems has shown that opportunities lie in the underserved markets. But why do most women and men aspiring for jobs in the field flock to the big cities? Is that helping or hurting their prospects?

Dr Rashi Gupta: I think it's hurting the prospects. As I said, just a short while back that we need to have more rural development. See we are all running in a rat race, out here. And somehow if I had an opportunity, I would still go back to my roots, go back to the rural India. Stay there at peace and you'd be more innovative. You'll be more creative when you are peaceful with your mind. You know, when you have that happiness, around you, you will be more creative, you'll innovate. I mean look at it here, you take at least one and a half hours. I mean this is pre-COVID and when things are normal, you take at least one and a half hours to travel from one point to another point in a city. While if you look at the rural or the semi-rural places, it's not one and a half hours wasted in travelling and the stress that you have of traveling. Secondly, here you don't even know your neighbours. In the rural places, in the villages each and every one is known to you. I mean, something happens. You're still there. You can still discuss, you can open up your minds and talk. I mean, that is what a human nature is requiring today. When we are all missing that in the urban lines. So you know what? Okay. I understand that rural India is having a challenge of power. So why not the youth create something at the rural India to upbringing the rural segment. Which is something which creates a job opportunity for them, which creates the infrastructure out there for them. And of course, which definitely lets them to be with

their grassroots, with their families and that will give them more happiness. You know what today, the happiness index is very low among the youth. So, if you can have technology combined with happiness as an emotion, I think that would change the whole perspective of the power sector or even the rural India that we are looking at.

Host: That's very interesting because of course, happiness fosters innovation and creativity. Now you're an important voice for e-mobility and energy storage standards, globally. So do you think these advanced battery systems can become more safe and sustainable?

Dr Rashi Gupta: Definitely, yes. My answer is very positive to this. I am definitely looking forward to have more safety and sustainability imbibed in the entire ecosystem for e-mobility and energy storage. Lot of work is being done behind the scenes to bring you something which is more safe and sustainable. And by sustainability, I just don't mean a product development. I mean, the entire ecosystem. Right from building, the first inception of the R&D till recycling and reuse of the same product, ok? And involving each and every aspect of the society. So whether it is gender, it is you know, urban or rural divide or it is the type of the quality that you're building in. I mean, everything in the ecosystem, it should be a 360-degree view that we are talking about here. So definitely yes, a lot of work on standardization is going on. India definitely has done a lot of work and India has been a pioneer to put in a BMS, a Battery Management System standard, which is the first ever globally written standard and it's implemented. So that is something, yes, we are doing a lot of work. I'm very sure that, you know, with the new start-ups coming. In the way youth is taking up sustainability and in climate change I'm very sure we can have more sustainable and a safe society to work with.

Host: That's so interesting that you're saying that it's in India where the innovation and R&D is happening in safety standards. A lot of attention in fact has been turned to talent seeking international grants, looking for greener pastures abroad, when it comes to R&D and study in fields of renewable energy storage, why do you think that is happening? How can we help retain that talent in India? What are the opportunities? Clearly, you, you've already laid out that there's a lot happening here and that we need more minds.

Dr Rashi Gupta: India has till date not been a pro R&D country. You know, we are more of a trading and a manufacturing kind of a country, but that is shifting now. The whole focus is now shifting, like with the new PLI scheme also that has come in. We are talking of advanced cell chemistries out here. I know so many labs behind the scenes who are actually working on having advanced chemistries on having safer systems. So what is important now here is that we need to showcase to the young talent that yes, there is an opportunity for you. And that can happen only when the industry and academia collaborate, give those young minds a platform. Actually, with every generation moving ahead, the IQ is increasing. And the generation, which is going behind, has to realize that the young minds are much smarter. They're, much faster. So what we need to do is we need to have to increase our pace with them and we have to, we have to be much faster in teaching them things that we have learned, and we have to understand what is their requirement. What is so fascinating about going to another country and doing things, which they can do out here. But I think the scenario is changing now government has also done a lot of work with the Start-up India mission where a lot of these young minds can put

up their companies. At our times when we started funding and fundraising was, and, you know, getting debt-rate. debt financing, was very difficult. But things are changing now I see a lot of venture capitalists, Round A, Round B happening and these start-ups are actually getting their money and venture capitalists are also now opening up from the traditional mindset to come up with you know, they want to invest in innovative tech. So I think, yes, India can retain talent subject to, we have an industry-academia collaboration and we give them a taste of success at a little early age. Maybe smaller successes but at an early age that would change the ideas, then would feel, ok, I am capable of doing it. I don't need to go out to other countries.

Host: So industry and academia, collaboration is important, also showcasing work. So bringing all that together. If I were to put you in a time capsule Dr Rashi and ask you to go into the future 10 or maybe even 20 years from now, what do you see as a role of women in STEM, in India?

Dr Rashi Gupta: Wow. I would love to try and travel in this in the time capsule and what I can imagine right now is women being even more powerful. We, women having more opportunities. And I see a gender balance. I see equality in the next 10-20 years coming in because I can see a balance. I can see something, you know, which is so beautiful, which is having an energy balance, which is positive. When you know, men and women are treated equally, the children and the elders are treated equally. Everyone has a voice to give. Everyone has energy independence. Everyone is happy. And that is what I see coming in the next 10- 20 years. Because today that we are working on is giving everybody a sense of energy security. We all are trying, whether it is industry, it is government is the consumers. Everybody is trying to have the greener energy come together. And when all of us will collectively work towards it I'm pretty sure that this imagination that I just had of in the time capsule will be a reality in the next decade. Because this is a transformational decade for the power sector and I'm sure that women are going to lead this transformational decade to make a more happy, sustainable, resilient society that we all can be in for the next generations.

Host: And sticking with that happy thought and that lovely visualization. What would be your advice be to aspiring women scientists in the energy storage space?

Dr Rashi Gupta: I would say, you know, that women are the best at storage. We store everything .and just now we have to learn how to store two types of energies. One is your own energy, which is very, very important. And second is the energy of that is the electricity energy storage, ok? Women have always learned how to store money in those food jars, you know, that India has a concept? Then we have learned how to store food, water, I mean these are all types of energies. But what we have to now learn is how to store electrical energy. Which is very very focused, and which is now getting glamorized. So I'm very happy about it. And I'm sure women, we by nature I mean, Indian women specifically by nature, have that upbringing where we are taught to save everything and women by general can save and store because we are powerhouses. So now it's just that we need to learn how to store electrical energy, how to innovate, to store many different types of energies that we have, and I'm sure women can do it the best. Something, another thing that I would like to add for women is, you know, we get lost in our day-to-day activities. We get lost in our family responsibilities. So something that each and every woman should understand is that we need to upgrade ourselves constantly. A very

important aspect is please upgrade yourself constantly in terms of your technicalities, in terms of your skills, in terms of the knowledge base that you have, because that is something going to keep you ahead of time. That will help you deal with the competition around you. That will help you store and excel with the energies that you have.

Host: Dr. Rashi. Thank you ever so much for speaking to the Word to the WISE podcast.

Dr Rashi Gupta: Thank you so much Shivraj.