INTERVIEW

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"The need for energy efficiency in appliances is obviously quite high in India. However, a major challenge that the country faces is that the average consumers across the country have not yet adopted energy efficient appliances".

Energetica India catches up with Mr. Narendra Badve, Director & Country Head - Sales, Industrial Power Control, Infineon Technologies India to get insights into the company's performance in Renewable Energy and Energy Efficiency Appliances.

Renewable Energy

ENERGETICA INDIA: **How do you see Renewable Energy segment growing in India? What are some of the key growth drivers and challenges in this industry?**

NARENDRA BADVE: The Indian Government has set ambitious goals of achieving 100GW solar capacity and 60GW wind capacity by 2022. Currently, we are already at 10GW plus solar installed capacity and 27GW plus wind installations. There is an expectation for high growth in the next five years. Eventually, India is looking at generating 40% of its energy needs by clean energy i.e., 350GW by 2030 out of an estimated 850GW.

Some of the key challenges for the renewable energy segment in India include availability of land, financing, grid connectivity, and economies of scale. This is improving as the market evolves, and also with clear government direction and support. With declining tariffs, we may be reaching grid parity sooner and this will also motivate higher investments into this sector. Another limitation ofrenewable energy is the fluctuation in availability owing to nature (sunshine and wind resources). Hence, a judicious mix of conventional and renewable energy, boost in transmission capacity, and stringer grids will also need to be developed simultaneously.

ENERGETICA INDIA: **What are Infineon's key plans in this domain in India?**

NARENDRA BADVE: Infineon Technologies is focused on the India market, with an ambitious growth charter for the next five years. Our four key business verticals include Industrial Power Control (IPC), Automotive, Chipcard & Security, and Power Management & Multi market. Of which, the IPC business unit is mainly focused on creating power solutions for key sectors like power, renewable energy, infrastructure and energy efficient appliances. Considering the increased focus of the Government in all of these segments, we are looking to work closely with the Indian industry for new product developments for the local market. We partner with key local and global players in these areas.

ENERGETICA INDIA: **What are Infineon's key solutions in the renewable energy space? Can you highlight some of your innovations in the Solar industry?**

NARENDRA BADVE: Infineon plays a very active and frontal role in energy management. We design, develop and manufacture power semi conductors that enable highly efficient renewable energy generation (key focus on wind&solar energy from few 100W to several MW), the transmission and distribution is also supported with power electronics for efficiency, power quality and reliability upto GW level with advancements in thyristors and insulator-gate bipolar transistors (IGBTs). On the consumption side, appliances, lighting, transportation and industrial equipment are all increasingly relying on power electronics and power semiconductors for energy efficiency and helping reduce carbon emission. In case of solar systems, the solar to electric energy conversion rate is ~ 15% and is generated at a low voltage DC. Inverters are used to convert this into a usable form at different voltage and frequency. The expectation for these inverters is to operate at very high conversion efficiency.

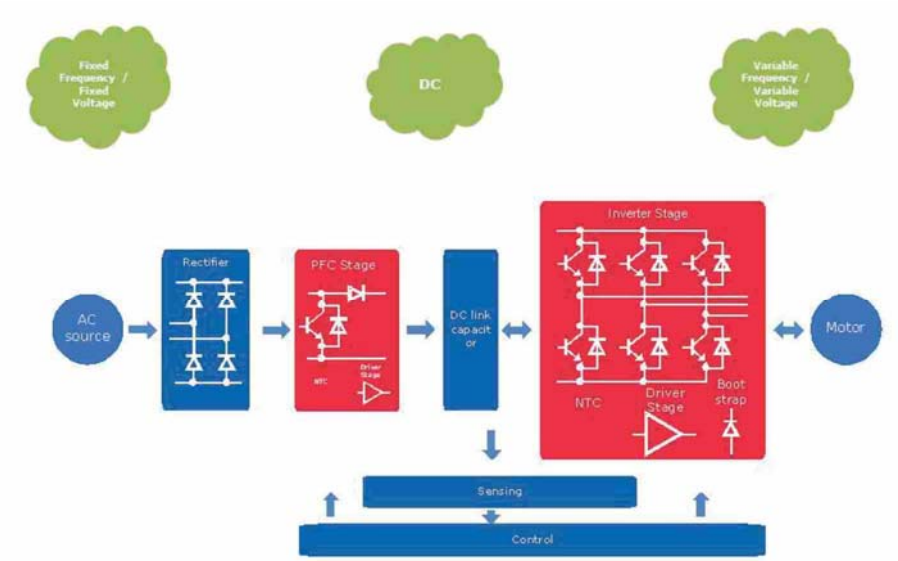
Infineon has enabled inverters surpassing99% benchmark. We are leading the industry with MOSFETs, IGBTs and now the wideband semiconductors like gallium nitride (GaN) and silicon carbide (SiC). Our latest generation of TRENCHSTOPTMIGBT5.XT IGBT module and CoolSiC™ MOSFETs are revolutionising the inverter space with highest power density, efficiency and reliability.

All these attributes are equally important as not only the cost but total cost of ownership is also critical for renewable energy propagation. We will be expanding the portfolio in the coming months to address the wider spectrum of renewable energy.

In both solar and wind energy, electricity generated needs to be converted in a form (voltage and frequency) so that it can be either transmitted over long distances or consumed directly. This electrical conversion takes place in equipment called power electronic converters. Infine on supplies the key components called power semiconductors (IGBTs, MOSFETs) for such converters. We have a new state-of-the-art technology called .XT in High Power IGBTs. With this new technology, it is now possible to operate at temperatures as high as up to 175 degreeCelsius (junction) and also increase the lifetime substantially.

ENERGETICA INDIA: **How is government support in this area helping for development of local business?**

NARENDRA BADVE: The local Government is now pushing for faster installations to achieve its 2022 targets. Thus, we see great impetus in this area. While developed countries are focused on solving the energy (kWh)



Typical solution for Inverterized Appliance

problem, India is in the process of solving the capacity (kW) problem. The electronics portion that includes the inverter/converter products are still largely imported and expected to progressively localise in design/manufacturing in line with the 'Make in India' policy.The Government can clearly help the industry here, thus achieving the vision of clean energy adoption with locally designed and manufactured converter / inverter products.

Energy Efficient Appliances

ENERGETICA INDIA: **Could you elaborate on the trend towards penetration of energy efficient appliances in India?**

NARENDRA BADVE: Many developed countries have already achieved 60% to 90% penetration level for energy efficient appliances, while India has just started on this path. Appliances like fans, air conditioners, refrigerators, etc. are all major contributors to energy consumption. We are rightly accelerating the efforts to move towards energy efficiency or what we call "inverterized appliances". As an example a ceiling fan which consumes 70W power, when using brushless DC (BLDC) motor approach consumes 35W or lesser. The Energy Efficient Services Ltd. (EESL), Bureau of Energy Efficiency (BEE) and others are enabling fasteradoption of energy efficient appliances. The success achieved with LED lamp program, is helping drive this in the appliances market. Multinational players are already aggressively selling inverterized appliances in the Indian market and local players are accelerating these efforts.

ENERGETICA INDIA: **What are Inverterized Appliances and how do they help in increasing energy efficiency?**

NARENDRA BADVE: Motors are a key part of appliances. So far, the traditional approach has been based on only two operating controls (ON/OFF) with no speed control techniques. This leads to much higher power consumption. On the other hand, inverterization is the technique commonly used these days - also known as Variable

Speed Drive (VSD) -wherein an inverter converts power from DC to AC and the power is then converted back to DC. In addition to benefits of its quieter and smoother operation, the inverterized mode also helps to reduce average power consumption in comparison to the traditional ON/OFF mode.

ENERGETICA INDIA: **What are some of the growth drivers & challenges faced by the industry?**

NARENDRA BADVE: One of the key growth drivers is the extensive growth in demand for electrical appliances riding on the back of an exploding urban population. While this is a great scenario for businesses, it does place an intensive strain on electricity supply if left unchecked. So, the need for energy efficiency in appliances is obviously quite high. However, a major challenge India faces is that the average consumers across the country have not yet adopted energy efficient appliances.

Conventional vs Inverterized Appliances

This slow rate of adoption is due to a lack of local design and manufacturing capability (electronics portion), low consumer understanding on long-term cost (adding inverter design portion) versus benefit (long-term energy bill saving), and a resulting dilemma to pay higher price for the product. Educating the end consumer on the benefits of energy efficient appliances can be one of the ways to help fasten this pace of adoption, and in turn help propel growth of this industry.

ENERGETICA INDIA: **What are Infineon's focus areas in this market, and what are your product/solution offerings in this market?**

NARENDRA BADVE: Infineon delivers energy efficient and reliable semiconductor solutions at the best performance per unit cost for power electronics systems. We majorly focus on developing complete designs to help customers reduce time to market, and also work closely with eco-system partners to develop localized solutions.

Some of our key markets include fan, air conditioner, refrigerator, solar pumps, among others. Infineon offers a range of products that features dedicated motor controller, intelligent power modules (IPMs), and discrete IGBT products for this market. We cover complete solutions in this market including applications for BLDC fans, inverterized air conditioners and refrigerators, desert coolers, solar pumps etc.

ENERGETICA INDIA: **What is your opinion of the Government's initiatives to drive energy efficient devices and appliances in India?**

NARENDRA BADVE: The India Government is focussed on accelerating adoption of Energy Efficient Appliances. LED Bulbs program has already been a big success. The EESL, BEE, and others are also helping drive this trend, so we are seeing good progress here. However, at present, a major portion of inverter boards are simply imported and hence there is a need for a parallel drive for adoption of locally designed and manufactured products in this segment. There is no clear policy in this regard currently, as most of the demand is catered to through imports, when the local industry has the capability to easily design and manufacture these solutions in India. Thus, there needs to be a push towards inverterization, which can also feature in the Government's popular "Make in India" program, for the local ecosystem to evolve and benefit in totality.