MAKE IN INDIA

tsmc

Think different

India Semiconductor Industry Growth, My Point of View (POV)

18th January 2023

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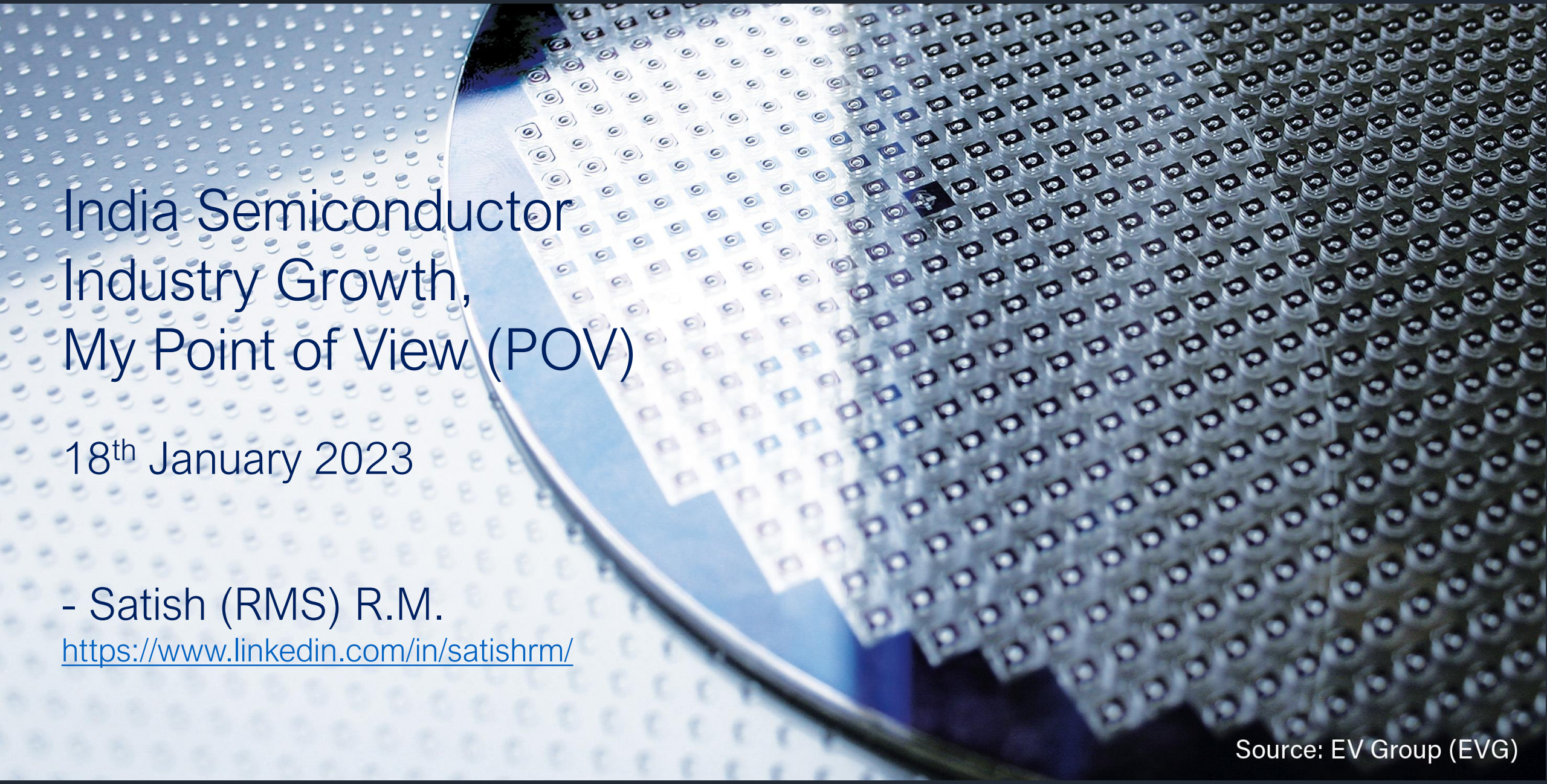

Source: EV Group (EVG)

The Pertinent Question.?

Inline with the below poll posted by an Intel Director, on LinkedIn a few weeks ago:

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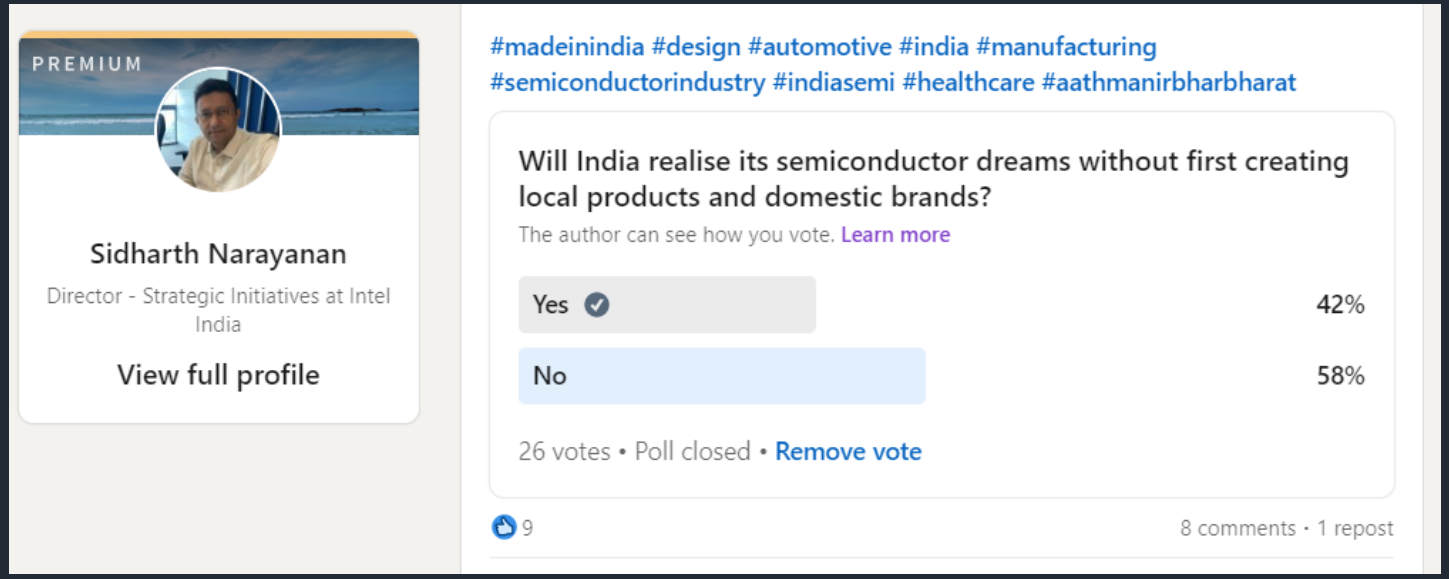
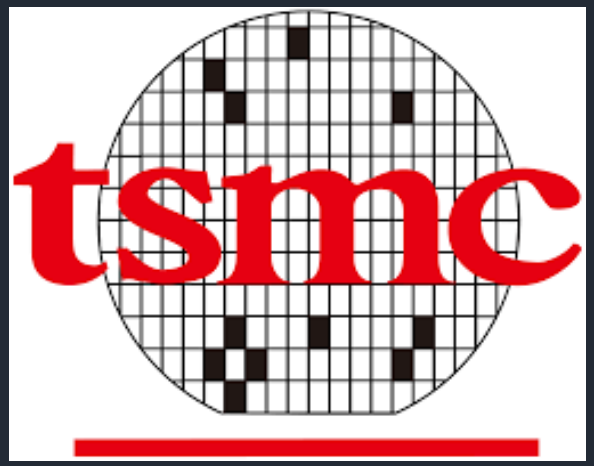


I voted in the affirmative to this pertinent question. Though it may seem counter intuitive at first, there are 42% of them who voted for India realizing its semiconductor (manufacturing) dreams without first creating local (electronics) products and domestic brands.

Having spent close to 20 years of my career in the Electronics System Design and Manufacturing (ESDM) Ecosystem that includes the Semiconductor Industry and Automotive Segment to name a few markets, This question enamored me and captured my imagination, so I did some quick research before forming my opinion and creating my Point Of View (POV).

Make in India.!

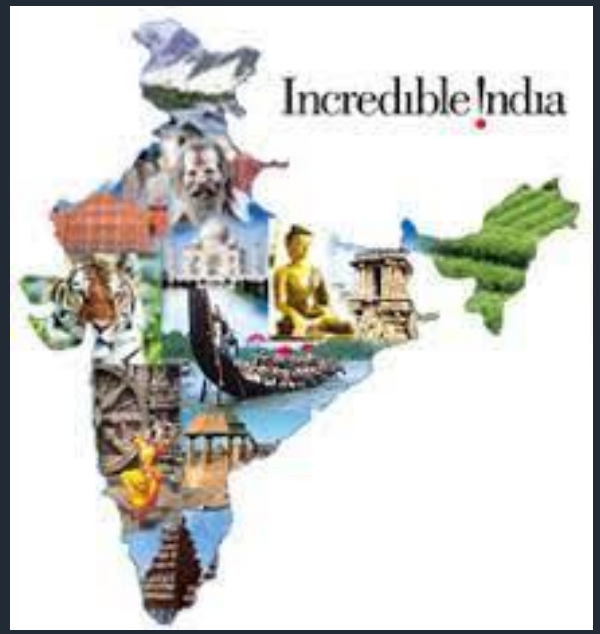
India’s dream of Atmanirbhar Bharat in Semiconductor Manufacturing seems a distant reality even now because there have been umpteen number of initiatives in the past to setup a leading-edge technology node fab in India and this supposedly cutting-edge foundries never happened.



Here is a classic case of barking up the wrong tree. The Semiconductor Manufacturing in India is in its Infancy and there is no point in burdening it with the expectations of mature industries and markets. TSMC itself took close to 3 decades of nurturing this ecosystem to become the Topmost destination for Semiconductor Manufacturing. It required Philips to help setup and incubate the technology transfer when TSMC was founded in 1987.

A Tale of Two Industries.!

India is too diverse a country to put a lens to and understand the complexities it has to offer in its entirety. So, it is always prudent to draw from parallels in other Industries. For example, lets consider the tale of two diverse industries where India not only leads but is also a world beater by doing better than even China, one is the IT Industry, and the other is the 2-Wheeler (2W) Automobile Industry.



In both these cases there was a real problem to solve, and India stepped up to the challenge. The IT Industry growth was triggered or turn around happened at the stroke of the new millennium in the form of the Y2K problem. In the case of 2W OEMs they stepped up to meet the challenge of providing affordable mobility for the masses pioneering the shift towards India becoming the largest market.

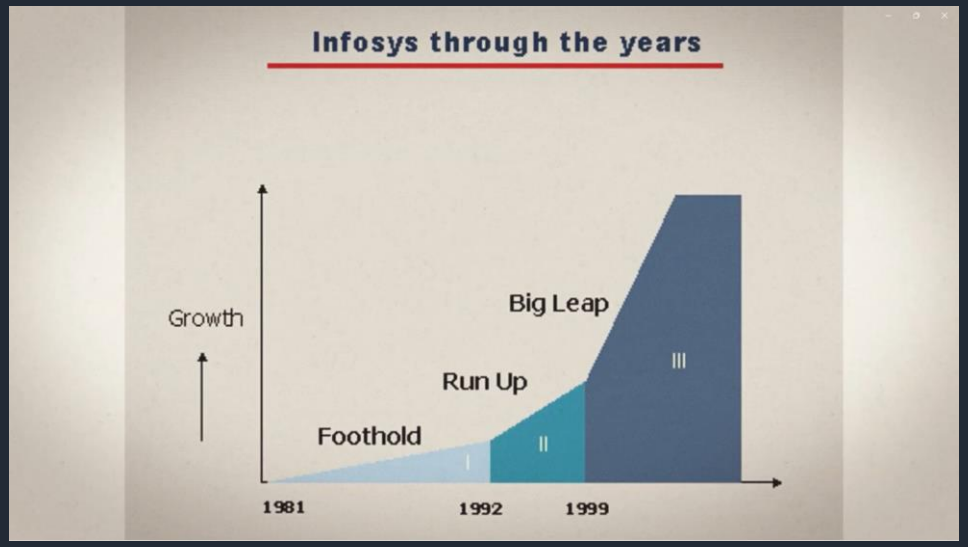
A Tale of Two Industries.!

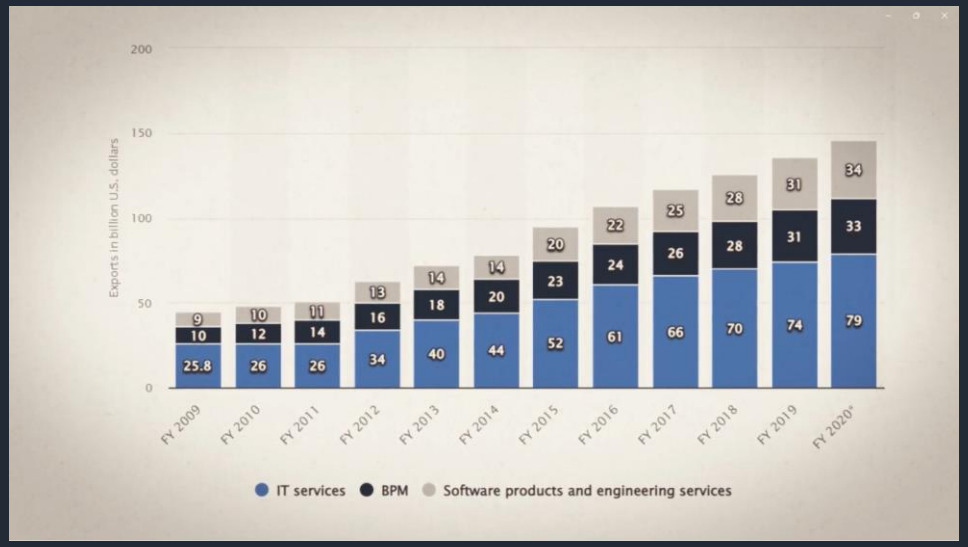
Target the Low Hanging Fruits 1st …

In the Tale of Two Industries, it is evident that this thread has a few other things in common:

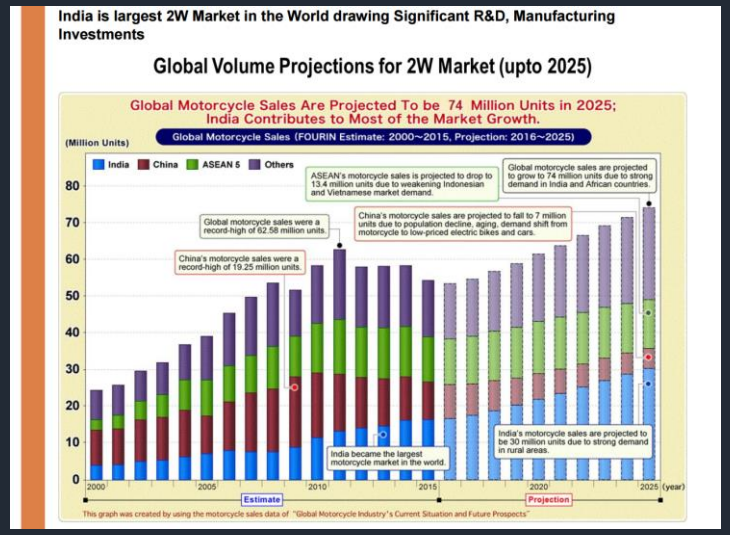
- Target the low end of the value chain 1st, Y2K for the IT Industry, Tech Transfer and focus on Vehicle Assembly instead of Engine / Vehicle Design which are at the high end of the value chain.
- Build Long Lasting Partnerships, Global Enterprises mostly in US and Europe for the IT Industry and Design and Manufacturing Partnerships with 2W Japanese OEMs who were the world leaders.
- Sustainable Year On Year Growth driven by the Market needs and growing demand of volumes for services and products returning High Growth, Revenues and Profits for Investors and Stakeholders.

Along with a Real Problem to Solve all the above contributed the IT Exports to grow from 1Bn USD in 1997 to 156 Bn USD in 2022 in 25 years at an impressive CAGR of 22.4%





Target the Low Hanging Fruits 1st …



2W Exports from India has doubled in 5 years from 2.3 Mn units in 2016-17 to 4.4 Mn units in 2021-22

STATISTICS

- Overview
- Production Trends
- Domestic Sales Trends
- **Export Trends**

SIAM
Society of Indian Automobile Manufacturers

Automobile Exports Trends

(In Numbers)

Category	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
Passenger Vehicles	758,727	748,366	676,192	662,118	404,397	577,875
Commercial Vehicles	108,271	96,865	99,933	60,379	50,334	92,297
Three Wheelers	271,894	381,002	567,683	501,651	393,001	499,730
Two Wheelers	2,340,277	2,815,003	3,280,841	3,519,405	3,282,786	4,443,018
Quadricycles	1,556	1,605	4,400	5,185	3,529	4,326
Grand Total	**3,480,725**	**4,042,841**	**4,629,049**	**4,748,738**	**4,134,047**	**5,617,246**

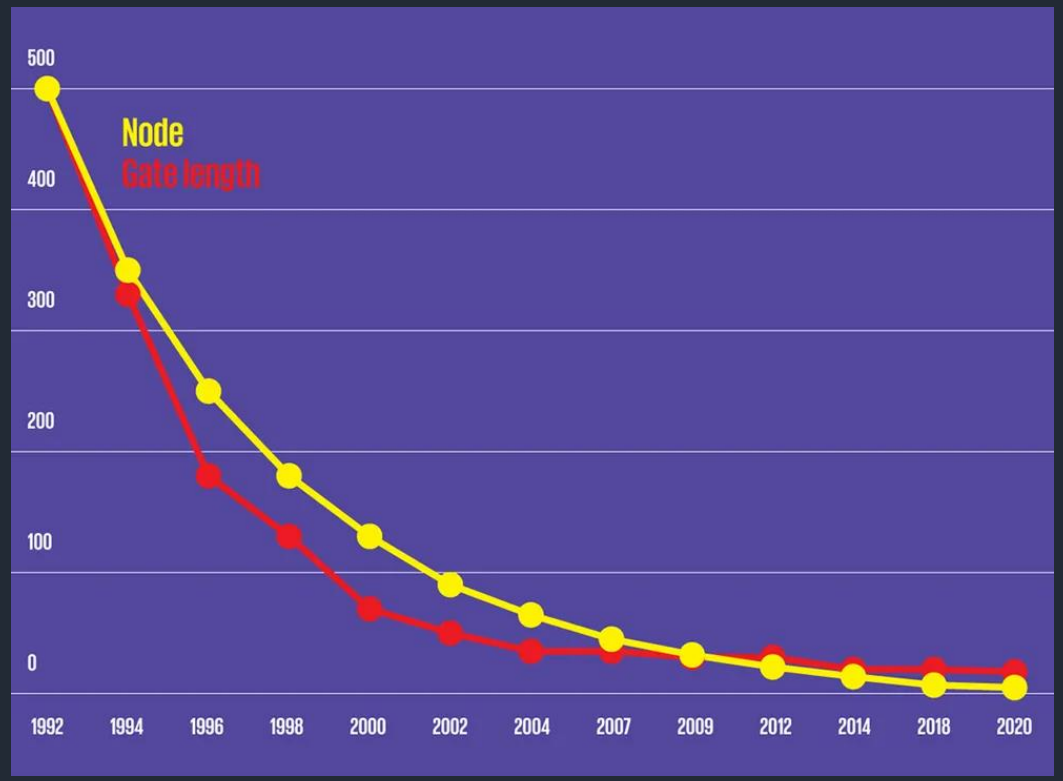
Similarly, the Volumes of 2Ws increased from < 5Mn units in 2000 to 10Mn units in 2010 to 20Mn units in 2020 and 30Mn units estimated in 2025 with projected CAGR of 11.4%

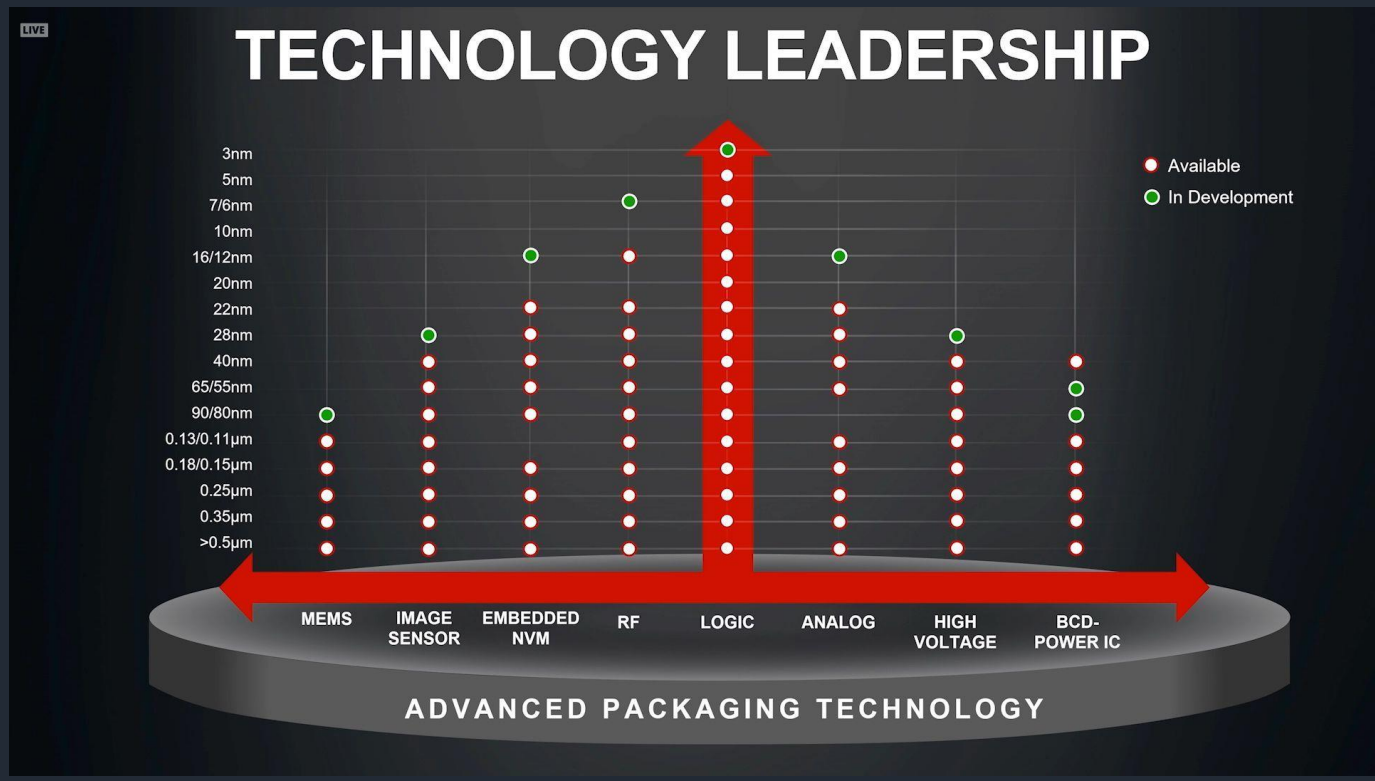
Now having identified parallels within diverse Industries that have succeeded in India and trying to apply the same for the Controlled Evolution of the Semiconductor Industry we need to identify a Real Problem to Solve. Focusing on the Real Problem to solve will lead to organic growth of the Semicon Industry.

With Electrification trend overwhelming the Automotive Industry there is a dire need of Power Devices that are affordable to the Indian Market. Currently the Power devices are priced too High for the India market needs. So, the situation is ripe for India to focus on Power Devices that are purpose built.

Focus on Assembly and Packaging of ICs 1st instead of Fabs…

Power Devices are generally at the trailing edge of the technology node and there is no need to focus on the leading-edge technology nodes. Since the trailing edge technology nodes are close to obsolescence in the developed regions and markets, it is easier for the technology transfer to happen for these nodes from the developed markets to developing markets like India and lesser restrictions on technology transfer compared to having leading edge nodes transferred to developing nations like India. This will also cost lesser compared to having cutting-edge foundries from leading foundries in the world.





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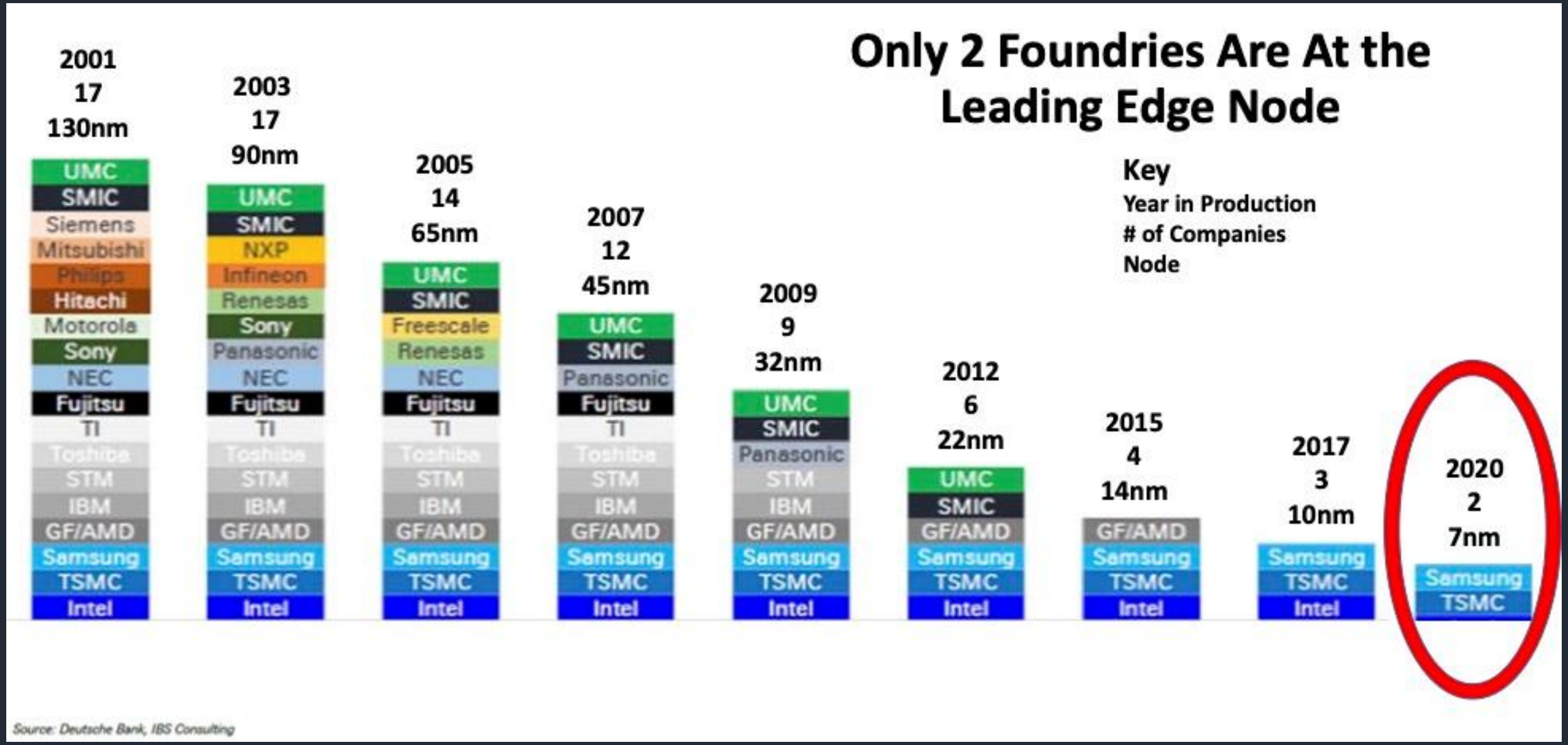
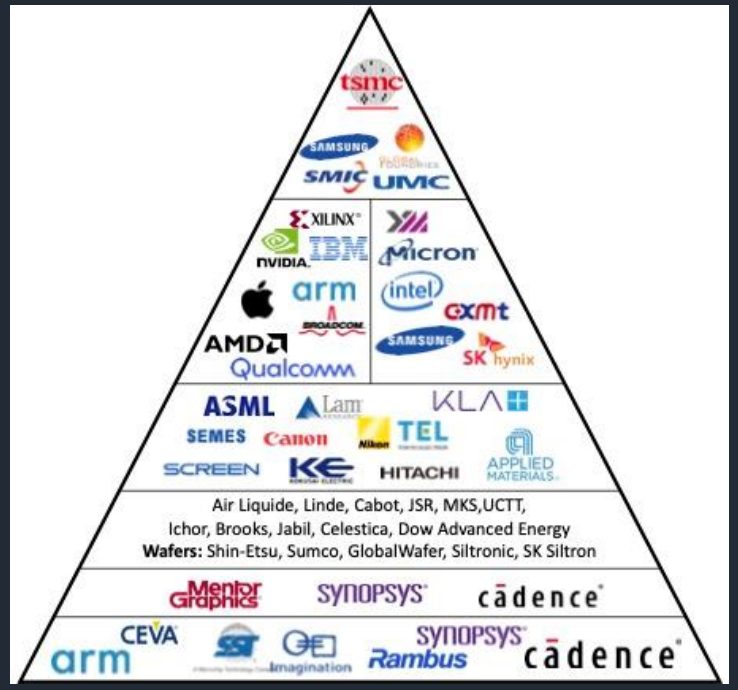
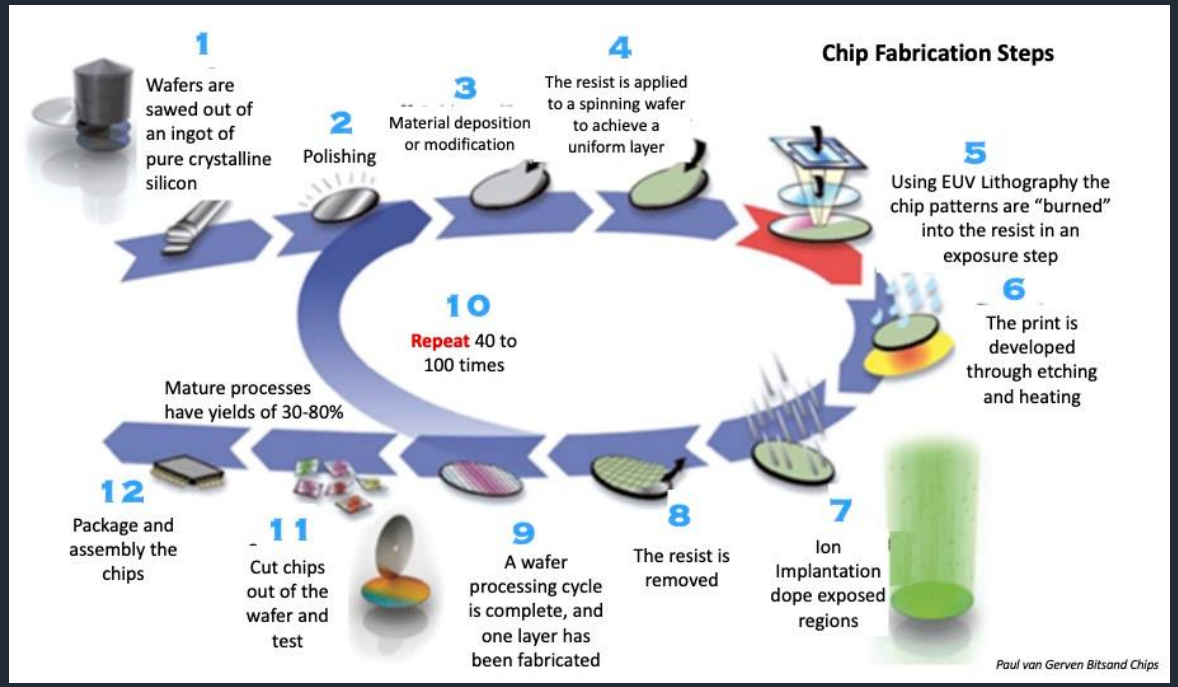


Focus on Assembly and Packaging of ICs 1st instead of Fabs…

In addition, if we apply the commonalities from the Tale of Two Industries to the Semicon Industry:

- Target the low end of the value chain 1st , Focus on setting up assembly, testing, marking and packaging (ATMP) plants 1st instead of focusing on fabs. Once this ecosystem is strengthened then it becomes easier to device government policies to inhibit Imports of finished Semiconductor products.
- Build long lasting partnerships with the Global Packaging Ecosystem and build indigenous capability and Incremental Innovations of Packaging for enhancing Thermal Performance of Power Devices. Achieving the Power Devices to meet the Electrification Trend at an Indian Price Point will prove to be a Disruptive Innovation in the Global Power Devices Market and lead to exports from India, as is for 2Ws.





Focus on Assembly and Packaging of ICs 1st instead of Fabs…

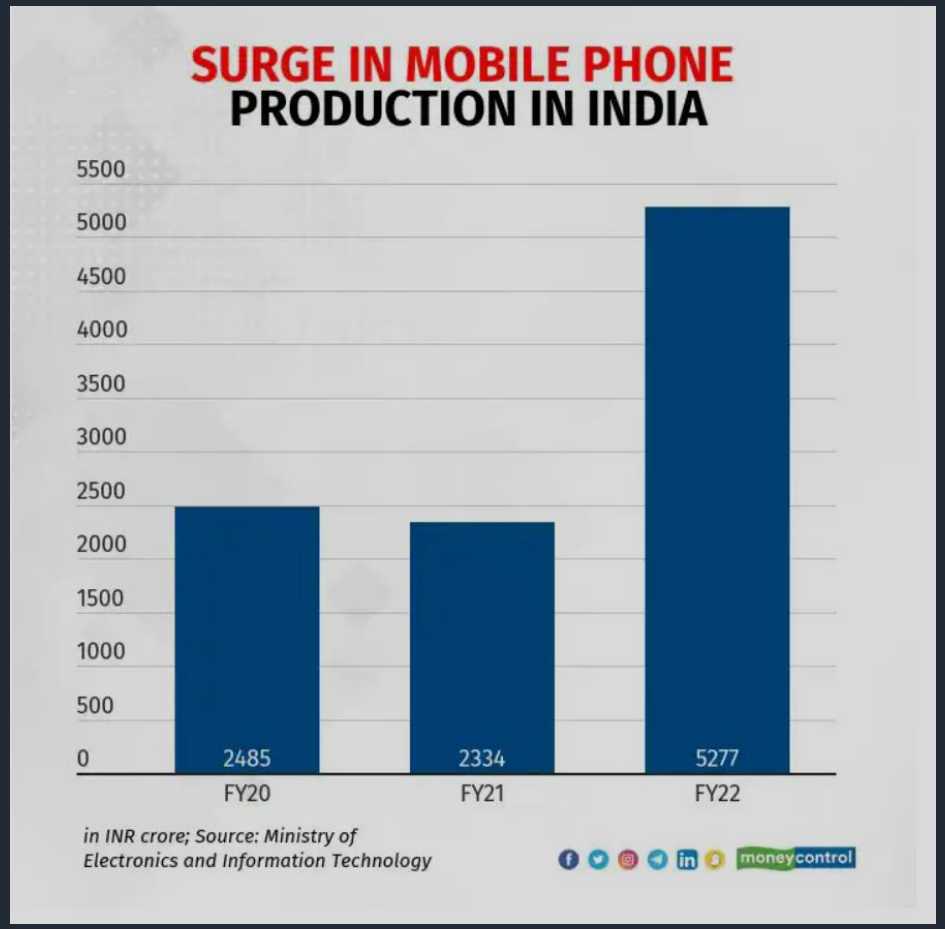
Furthermore, the semiconductor industry promises to provide a sustainable Year on Year Growth for the India Market considering that India is now the 2nd largest manufacturer of Mobile Phones in the World.

Mobile Phone Manufacturing in India

FY20, 21, 22 figures are in Rs crore

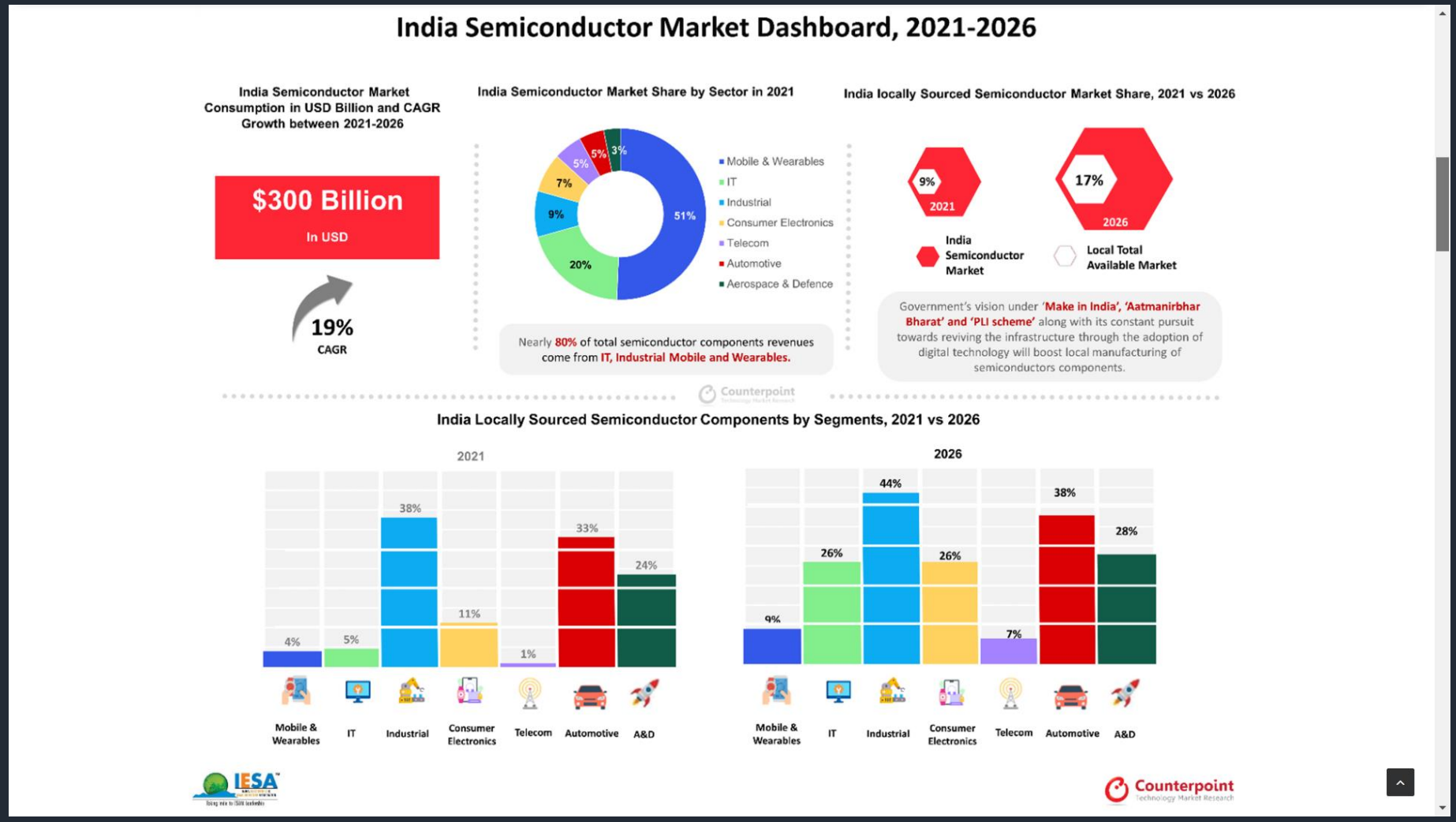
Category	FY20	FY21	FY22	Change (FY20-21) (%)	Change (FY21-22) (%)
Mobile Phones (Global Brands)	71,322	62,675	79,691	-12.1%	27.1%
Mobile Phones (Domestic Brands)	2,485	2,334	5,277	-6.1%	126.1%
Total Mobile Phone Manufacturing in India	73,807	65,009	84,968	-11.6%	30.7%

TOI Source: Ministry of Electronics and Information Technology



Focus on Assembly and Packaging of ICs 1st instead of Fabs…

IESA (India Electronics and Semiconductor Association) has released 'The Semiconductor Manufacturing Supply Chain,' report. This report estimates an opportunity of about 85B to 100B $ out of a $550-600 billion annual global market opportunity by 2030. The Semiconductor Packaging Industry is expected to be about 10% which translates to 8B to 10B $ opportunity for ATMPs.

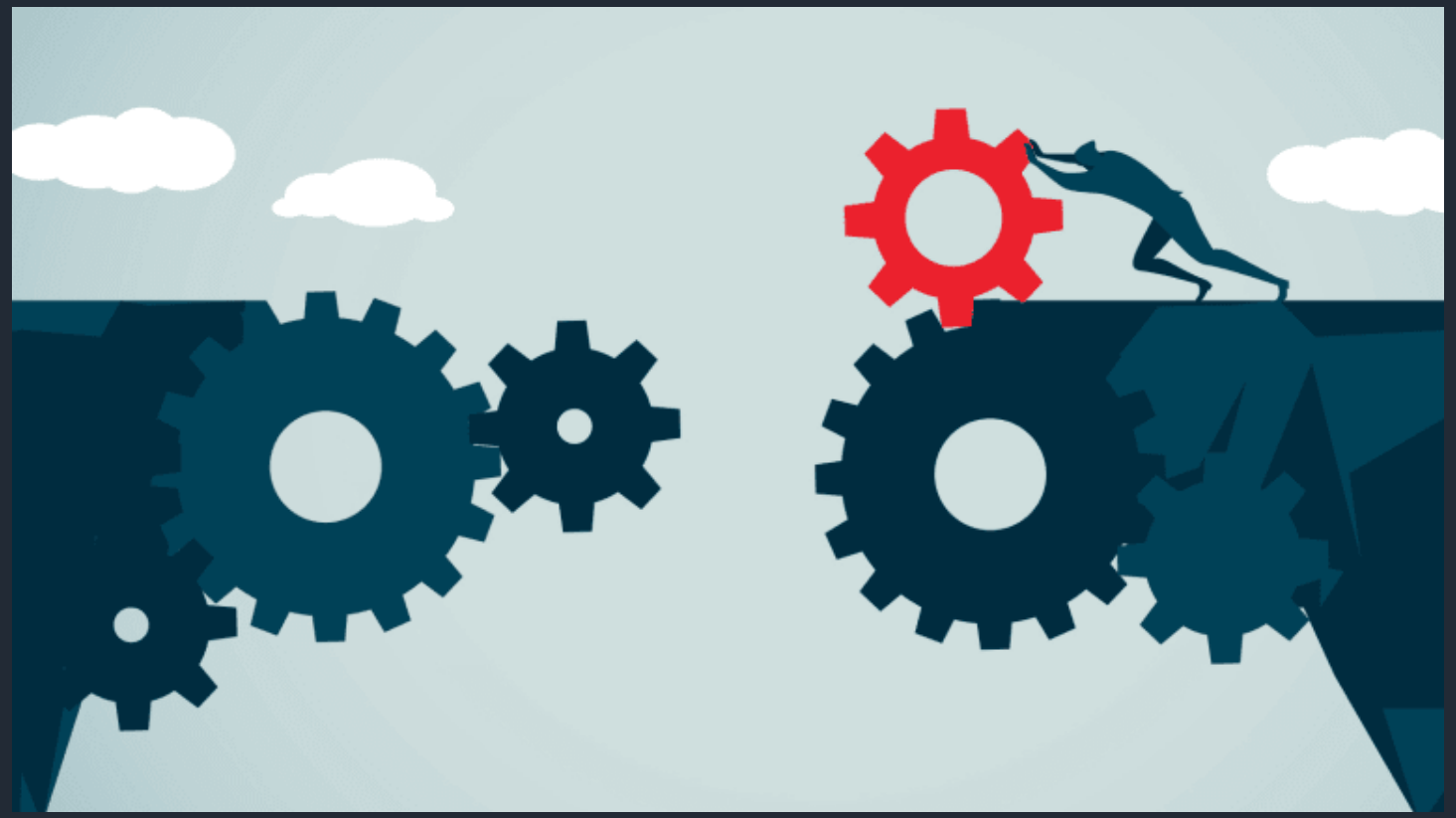


India’s Impending Challenges

Grid Infrastructure

An Electric Power Failure of 5 seconds means huge losses for the Semiconductor Manufacturers

Skill Gap

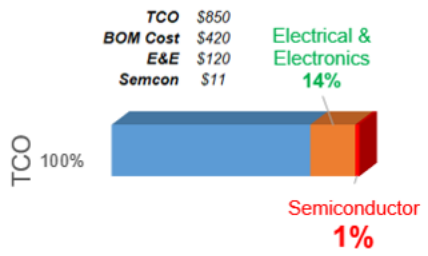


Though the Semiconductor Industry has strong Potential to create more Jobs the Skill Gap is going to be a Major Roadblock

Potential Opportunities – 2W Market in India

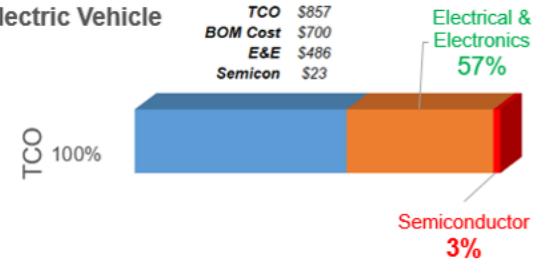
Electronics & Semiconductor BOM Analysis for 2W Market in India

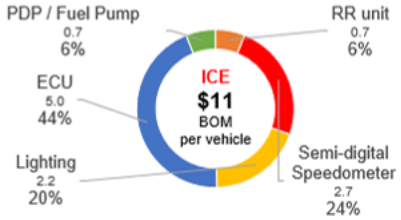
ICE

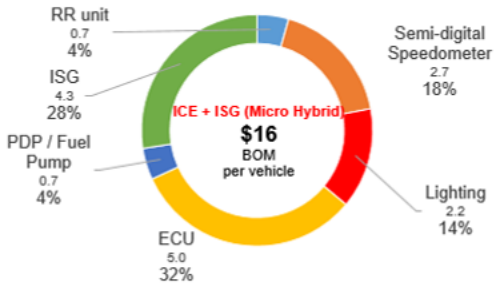


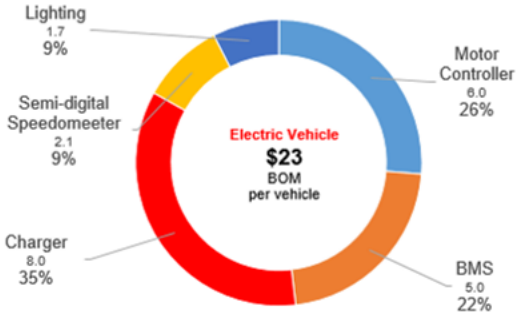
ICE + ISG

Electric Vehicle









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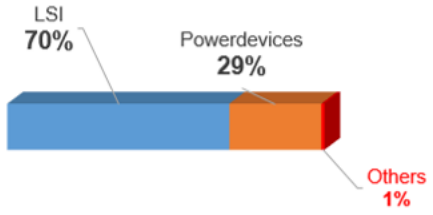

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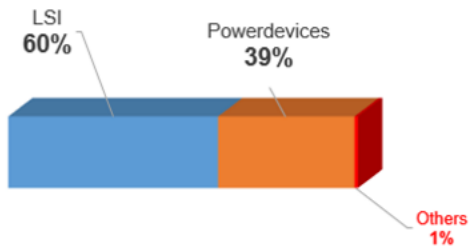
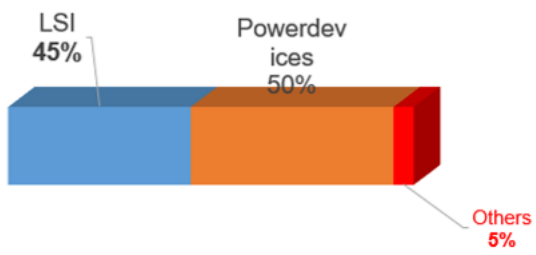
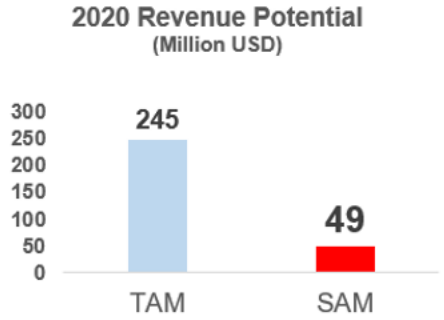
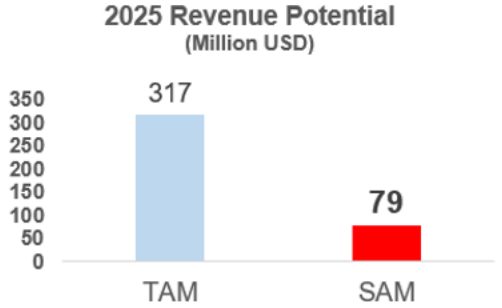


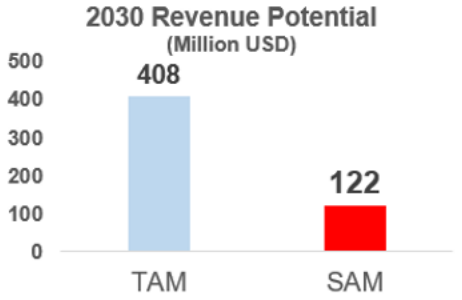
Electric Vehicle

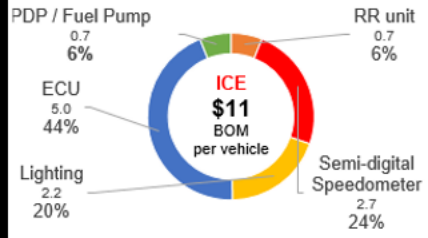


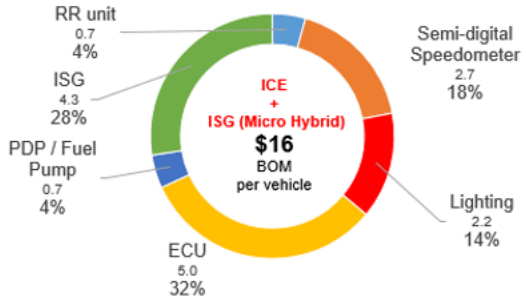
Business / Revenue Potential for 2W Market in India

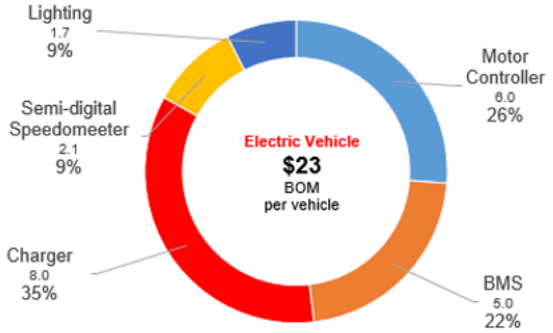


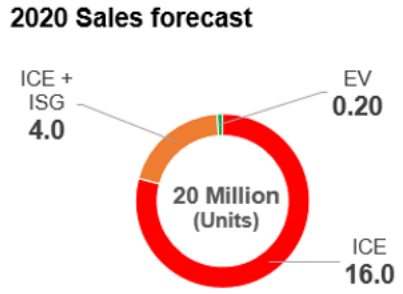


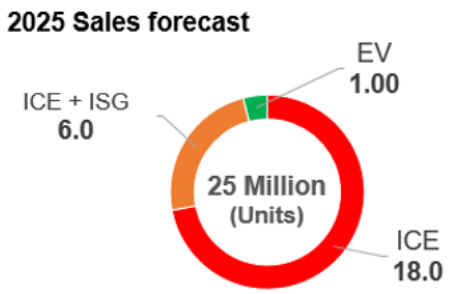


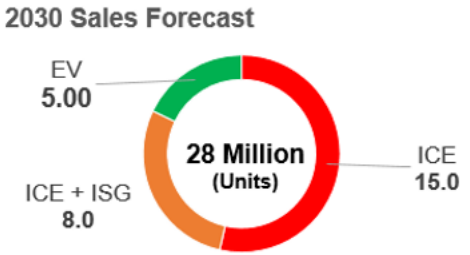












Potential Opportunities – Roadmap for Self Reliance

Key Highlights:

- Owing to the Electrification trend the Semiconductor Content will increase from 1% to 3% of the Total Cost of the Vehicle, from $ 11 in 2W ICE vehicle to $ 23 in 2W Electric Vehicle (EV).
- The Total Available Market (TAM) is $ 750+ Mn by 2030 when Electrification is complete in the 2W space which is only 1% of the Total Semiconductor Consumption in India across industries.
- 50% of this TAM is attributed to Power Devices which roughly translates to $ 375 Mn.
- So, focusing on developing niche Packaging for Power Devices in 2W market itself is very lucrative.
- To begin with even if we focus efforts and government policies on building packaging ecosystem for 2W Market in India the market size for ATMP opportunity is close to $ 200 Mn.
- Imagine if we could replicate this success in building packaging ecosystem for Cross Industries this could result in a Total Available Market of $ 20 Bn (Ideal case) by 2030 considering niche packaging.
- Building a strong packaging ecosystem along with policy support from the government will kickstart a growth trajectory and will also compel Semicon Vendors to eventually move their fabs here.!

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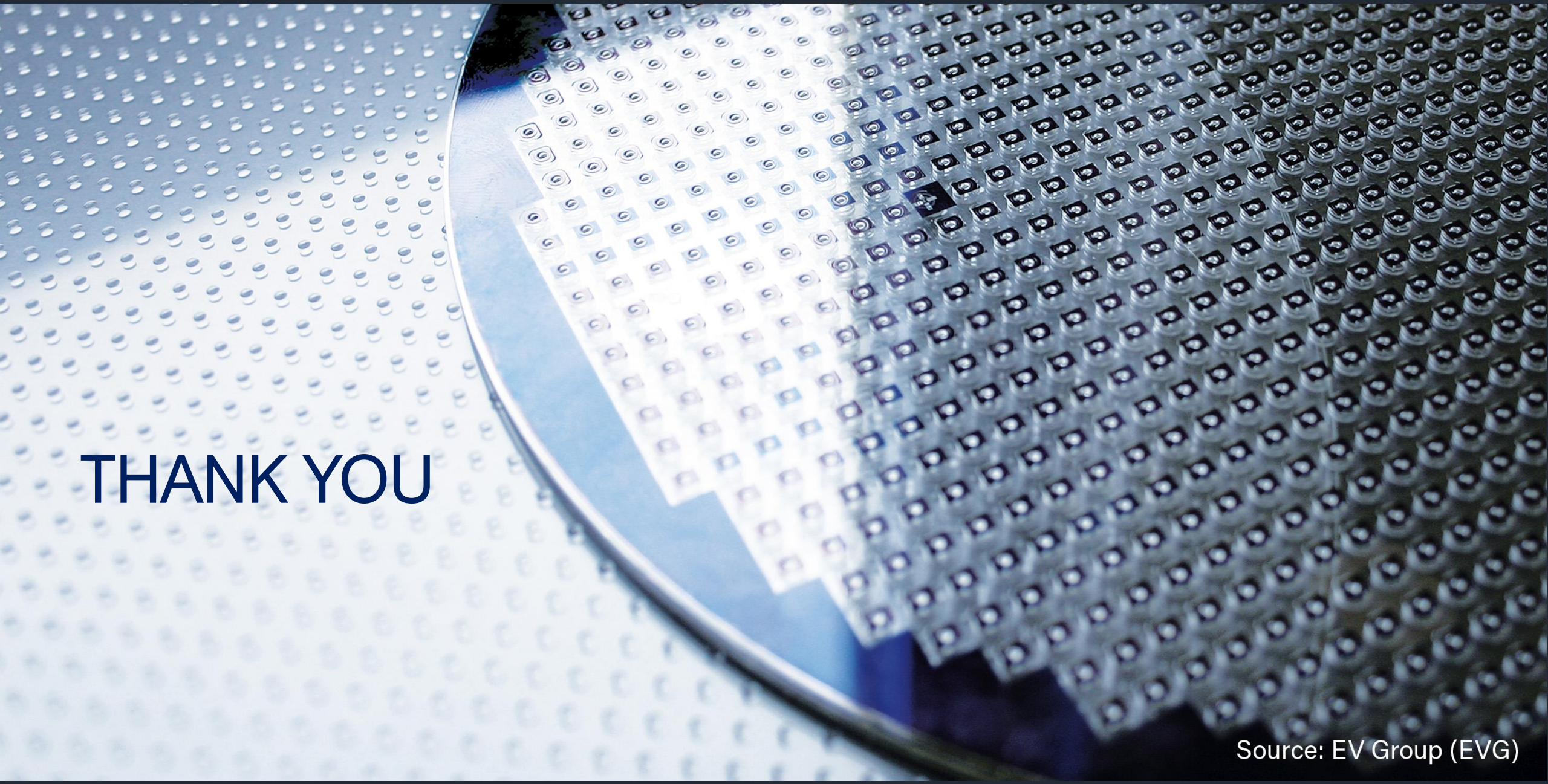
THANK YOU



Source: EV Group (EVG)

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