ICRA

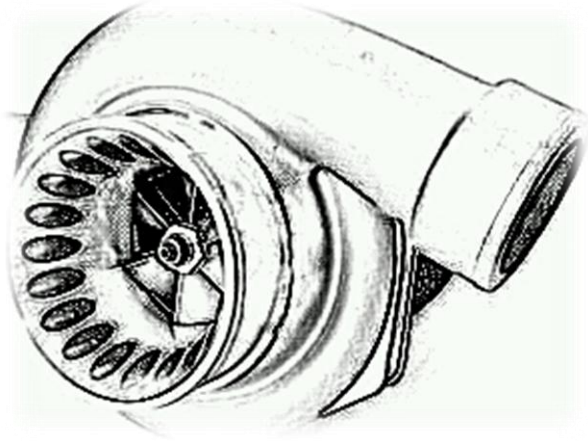
ICRA RESEARCH SERVICES

Contacts:

Subrata Ray
+91 22 6169 3385
subrata@icraindia.com

Pavethra Ponniah
+91 44 4596 4314
pavethrap@craindia.com

Ashish Modani
+91 20 6606 9912
ashish.modani@icraindia.com



INDIAN AUTOCOMPONENT INDUSTRY

Indian turbocharger industry to grow at CAGR of 14% during FY2016-FY2020e

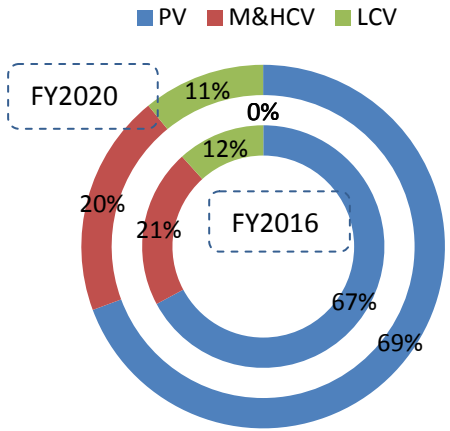
Market Potential: Indian turbocharger industry to grow at 14% during FY2016 - FY2020

A petrol turbocharger might cost 2x-3x times a diesel turbocharger

On an average, for a passenger vehicle, a diesel turbocharger costs Rs. 4,000 – 5,000 whereas petrol turbocharger is priced at ~Rs 15,000 per unit. Petrol turbochargers are designed to operate at much higher RPMs [revolution per minute] (as compared to diesel counterparts) which require the components to withstand high temperature; this explains the cost difference between petrol and diesel turbochargers. Cost also varies depending on the type of turbocharger i.e. a twin scroll turbocharger[1]-will cost almost double a single scroll turbocharger[2], whereas relatively complex variable geometry turbocharger could be even more costly. Realization of turbocharger for trucks is in range of Rs 10,000 – Rs 12,000.

In India, turbochargers are present in over 90% of diesel vehicles, though its penetration level in petrol vehicles is relatively low. In the backdrop of changing customer preference towards petrol engines in the PV segment, the domestic turbocharger industry—which is attuned to the diesel turbocharger could face some temporary readjustment pains, especially for supplies to the passenger vehicle industry. Nevertheless, increasing acceptance of turbocharged petrol engine should support demand for the turbocharger industry over the medium term.

Exhibit 6: Turbocharger Market Potential



ICRA expects market potential for the domestic turbocharger industry market to grow to Rs 2,600-2,800 crore by FY2020, registering CAGR of 14% during FY16-FY20. While volume growth could be modest at around 8-9% CAGR, value growth will be healthy as higher value added solution (VGTs, twin spool turbo) as well as new products to meet stricter regulatory requirements drive higher content-per-vehicle.

While the share of diesel vehicles in India is expected to moderate going forward, increasing share of turbocharged petrol engines as well as superior realization will drive the overall turbocharger market. Considering, gross margins of 45% and sizable raw material requirements (55% of the industry's turnover), primarily sourced from Tier II/III ancillaries, demand for turbocharger components is expected to drive Rs. 1,300-1,400 crore of revenue for Tier II/III ancillaries by FY 2020.

Source: ICRA research

[1] Twin-scroll turbochargers have two exhaust gas inlets and two nozzles, a smaller sharper angled one for quick response and a larger less angled one for peak performance.
[2] Single scroll turbochargers have single exhaust gas inlet and two nozzles

Turbocharged petrol vehicles gaining prominence in India

CAFE norms as well as stricter emission norms will further propel usage of turbochargers

Lower excise duty on small cars with small engine (<1.2L petrol or <1.5L diesel) is pushing turbocharger penetration, as OEMs can deliver higher power with a small engine

Why are turbochargers in petrol vehicle gaining prominence in recent times?

Improved fuel efficiency and reduced emission: The CAFÉ norms notified by the Government of India (GoI) in April 2015 mandate a 14% improvement in fuel efficiency by FY18 and 38% improvement after FY22 for OEMs. In order to meet the stipulated target by April-17, fleet fuel efficiency for petrol and diesel vehicles should improve to 18.2 Kmpl and 20.41 Kmpl respectively, from the current average of 16 Kmpl and 18 Kmpl, respectively. Turbocharger, cost effectively, could drive a 20%+ improvement in fuel efficiency, as compared to non-turbocharged engines.

Exhibit 3: Power output of various turbocharged petrol models vis-à-vis non-turbocharged variants

OEM	Model	Fuel	Engine (Ltr)	Power (bhp)	Torque (NM)	Mileage (Kmpl)
VW	Polo	Petrol	1.2L	75	110	16.5
	Polo TSI	Petrol	1.2L	104	175	17.2
Fiat	Linea Active	Petrol	1.4L	89	115	14.9
	Linea TJet	Petrol	1.4L	123	208	14.2
Ford	Ecosport	Petrol	1.5L	110	140	15.8
	Ecosport Ecoboost	Petrol	1.0L	123	170	18.9
TML	Vista Quadrajet*	Diesel	1.3L	74	190	22.3
	Vista D90^	Diesel	1.3L	89	200	21.1
MSIL	Baleno	Petrol	1.2L	83	115	21.4
	Baleno RS	Petrol	1.0L	110	170	~25

Source: ICRA research, Cardekho; KMPL: kilometre per litre of fuel; Models highlighted in Red are equipped with turbochargers
*diesel variant with fixed geometry turbocharger; ^: with variable geometry turbocharger

Higher Power Output: In India, small cars (< 4,000 mm) enjoy favourable tax duties as compared to larger cars. However, these small cars also have engine size (petrol < 1,200 cc, diesel <1,500 cc) restriction which ultimately limits power output. Recently, in order to address these concerns, some OEMs have launched turbo charged petrol engines in < 4,000 mm PVs which provides superior power output as well as improved fuel efficiency.

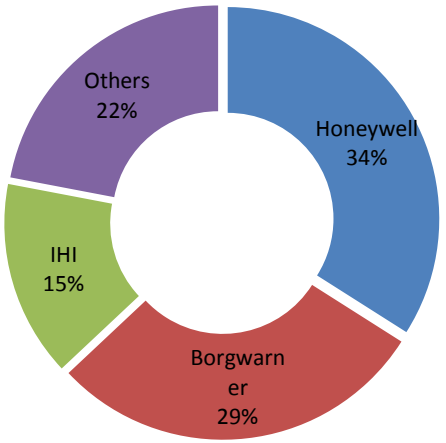
The type of turbocharger used also makes a big difference to overall power output. The *Tata Indica Vista* with the same *Fiat 1.3L multijet engine* provides additional 15bhp power (i.e. 20% more power) by replacing the fixed geometry turbocharger with a variable geometry turbocharger (VGT), without compromising much on the fuel efficiency front. Going forward, Maruti Suzuki India Limited (MSIL) is planning to launch its turbocharged *Baleno* which will give 30%+ more power--about 17% higher fuel efficiency with a 15% smaller engine. Considering favourable excise duty benefits on smaller engines (<1.2L petrol and <1.5L diesel, with overall vehicle length < 4,000 mm), turbocharger penetration is likely to increase in petrol vehicle enabling OEMs to deliver higher power and improved fuel efficiency, without major modifications in the overall vehicle or engine design.

Supplier profile: Honeywell and Borgwarner are global leader in turbocharger systems

Honeywell and Borgwarner are the leading suppliers of turbochargers in the domestic as well as global automobile market

Globally, the turbocharger market is primarily dominated by three players, namely Honeywell (34%), Borgwarner (29%) and IHI, Japan (15%). Other large suppliers include Mitsubishi Heavy Industries, Bosch Mahle and Cummins Turbo Technologies. A critical component with high technological entry barrier and a long validation process for vendor selection, lends high margins to turbocharger manufacturers. Assuming optimal capacity utilisation, ancillaries could enjoy high operating margins (~17%-20%) is the turbocharger manufacturing business.

Exhibit 4: Global Turbocharger Market Share*



Source: Roland Berger
*Including light CVs

Considering the strong technical know-how requirements, most of the domestic market is catered to by international majors either through their step down subsidiary or JVs in India. Turbo Energy Private Limited (Turbo Energy) is one of the largest turbocharger manufacturers in the domestic market, catering to all major PV OEMs as well as CV players. Cummins by virtue of its JV (Tata Cummins Limited) with Tata Motors Limited (for supplies of M&HCV engine) is one of the largest players in the M&HCV market. As per our analysis, Turbo Energy, Honeywell Turbo Technologies India Private Limited (Honeywell) and Cummins Turbo Technologies Limited (CTT) together accounted for over 90% of the domestic turbocharger requirement.

Turbocharger manufacturers are increasingly localizing their raw material requirements, supporting growth of Tier II ancillaries

Exhibit 5: Turbocharger suppliers for various automotive segments

Global Supplier	Indian Entity	% Stake*	Target Segment
Borgwarner	Turbo Energy Private Limited	32.6%	PV, CV
Honeywell	Honeywell Turbo Technologies India Private Limited	100.0%	PV, CV
Cummins	Cummins Turbo Technologies Limited	100.0%	CV
Mitsubishi	Mitsubishi Heavy Industries India Private Limited	100.0%	PV

Source: ICRA research; Mitsubishi don't have any manufacturing presence in India and rely on imports; *: Technology Partner's stake

Earlier, majority of the sub-components were imported, however economies of scale and long term demand prospects forced turbocharger manufacturers to increase their localization level. Various turbocharger components like turbine housing, compressor housing, shafts and turbine wheels are provided by Indian Tier II ancillaries. Indian ancillaries, especially those present in castings, forgings and machining business also benefits from growth in the domestic turbocharger market.

Annexure: What is Turbocharger?

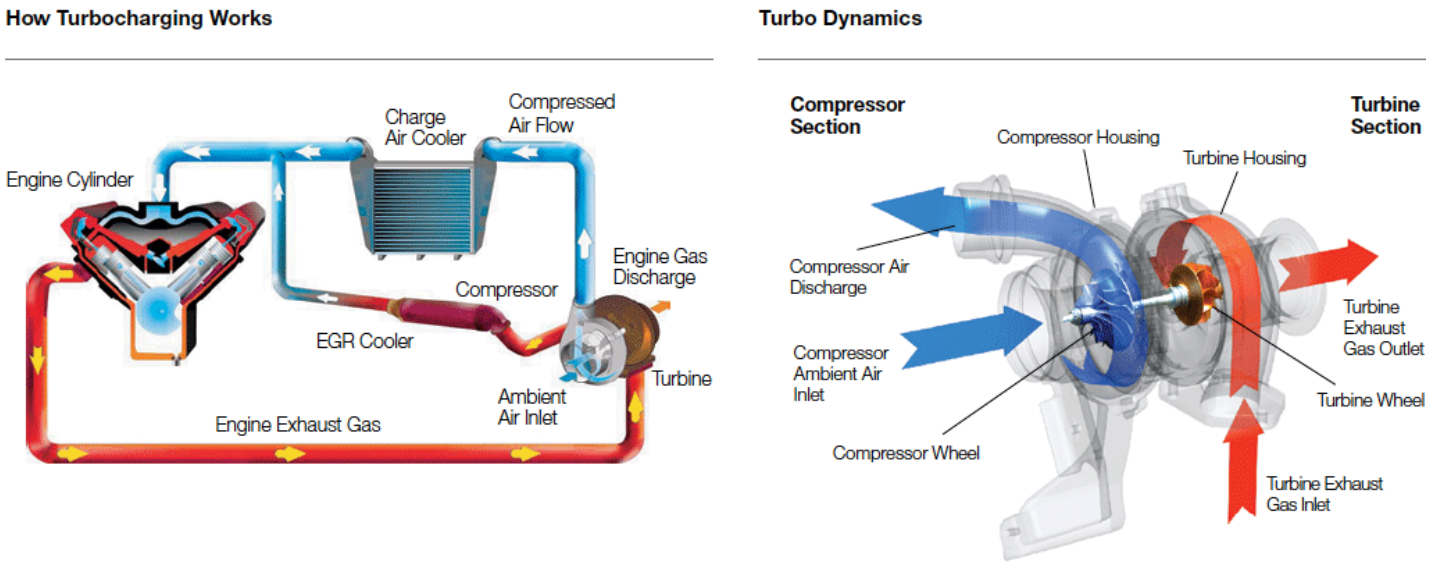
Turbochargers help improve power output and fuel efficiency

A turbocharger is a device which improves power output of engines using exhaust gas to increases overall air intake in the combustion chamber. Fuel combustion is dependent on the quantity of fuel and the amount of air available in the combustion chamber. Turbocharger allows more compressed air inside the engine's intake manifold, resulting in more efficient fuel combustion and hence superior power output, improved fuel efficiency and lower exhaust emission.

A turbocharger comprises of two sections, i.e. turbine and compressor section. Exhaust gases are guided to the turbine wheel inside the turbine housing, and exits the turbine through the turbine exhaust gas outlet. The turbine wheel, which is connected to the compressor section through a forged-shaft, drives the compressor wheel. The compressor wheel converts low pressure – high velocity – ambient air into high pressure – low velocity compressed air. The presence of this compressed air makes the fuel burn more efficiently, thereby delivering greater power while consuming less energy.

Unlike general perception, exhaust gases are used only to rotate the turbine and are not pushed back into the engine combustion chamber

Exhibit 1: Turbocharger working



Source: Honeywell

Annexure: Turbocharger Vs Supercharger

How are Turbochargers different from Supercharger?

Turbochargers and Superchargers work on similar principles i.e. they both push compressed ambient air into the combustion chamber

Both Turbochargers and Superchargers are forced induction systems i.e. they push compressed air into the intake manifold to improve power output. The main difference lies in the power supply, wherein the turbocharger relies on exhaust gases whereas the supercharger relies on a belt connected to the engine. Consequently, there is some power loss in the mechanical superchargers as compared to turbochargers, which also impacts overall fuel efficiency. However, there is no turbo-lag in supercharged vehicles as superchargers can work at low engine RPMs whereas turbochargers work best at high speed. A twin-charged vehicle benefits from both a turbocharger and supercharger, wherein there is no turbo lag at low RPM and better output at higher RPM.

Diesel vehicles predominantly use turbochargers

Diesel engines have excellent torque at low RPMs, which translates into high acceleration at low RPMs; however, as RPM increases, the acceleration rate slows down. For a turbocharged diesel engine, acceleration at higher RPMs improves as the turbocharger starts pushing compressed air into the intake manifold, thereby improving power output. Petrol engine do not have low end torque, a problem better addressed by superchargers. Consequently, turbochargers are preferred in diesel vehicle whereas superchargers are used in petrol vehicles.

Geographies like India and Europe already has high turbocharger penetration, thanks to high share of diesel passenger vehicles

Exhibit 2: Global Turbocharger Penetration

	N. America	Europe	China	India	Japan
CY15	23%	69%	28%	43%	22%
CY20	39%	73%	47%	48%	27%
Diesel %^	<3%	53%	<2%	44%	<1%

Source: Honeywell, ICRA research: ^: Share of diesel vehicles sales in overall passenger vehicle sales

Initially, turbocharger penetration was primarily driven by diesel vehicle, evident from Exhibit 2, with high diesel share geographies like Europe and India having high turbocharger penetration. Over the past few years, stringent emission norms and Corporate Average Fuel Efficiency (CAFÉ) regulation has prompted many global OEMs to start using turbochargers to downsize their engines to meet regulatory norms. Hence, geographies like US, China as well as Japan, have sizable turbocharger penetration despite low diesel vehicle penetration. China and US, which together account for over 40% global PV sales are expected to witness strong growth in turbocharger adoption over the medium term. In India also, while ICRA expects penetration of diesel PV to stabilize at about 35% level over the medium term (from 40%+ level currently), the increasing usage of turbochargers in petrol engine will continue to support the Indian turbocharger industry.

ICRA Limited

CORPORATE OFFICE

Building No. 8, 2nd Floor, Tower A; DLF Cyber City, Phase II; Gurgaon 122 002
Tel: +91 124 4545300; Fax: +91 124 4545350
Email: info@icraindia.com, Website: www.icra.in

REGISTERED OFFICE

1105, Kailash Building, 11th Floor; 26 Kasturba Gandhi Marg; New Delhi 110001
Tel: +91 11 23357940-50; Fax: +91 11 23357014

Branches: **Mumbai**: Tel.: + (91 22) 24331046/53/62/74/86/87, Fax: + (91 22) 2433 1390 **Chennai**: Tel + (91 44) 2434 0043/9659/8080, 2433 0724/ 3293/3294, Fax + (91 44) 2434 3663 **Kolkata**: Tel + (91 33) 2287 8839 /2287 6617/ 2283 1411/ 2280 0008, Fax + (91 33) 2287 0728 **Bangalore**: Tel + (91 80) 2559 7401/4049 Fax + (91 80) 559 4065 **Ahmedabad**: Tel + (91 79) 2658 4924/5049/2008, Fax + (91 79) 2658 4924 **Hyderabad**: Tel +(91 40) 2373 5061/7251, Fax + (91 40) 2373 5152 **Pune**: Tel + (91 20) 6606 9999, Fax + (91 20) 553 9231