

Industry Sector Emission estimates (Energy Use, IPPU)

Lead Partner: Council on Energy, Environment and Water

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The GHG Platform India is a collective civil society initiative providing an independent estimation and analysis of India's Greenhouse Gas (GHG) emissions across key sectors, namely, Energy, Industry, Agriculture, Livestock, Forestry, Land-use and Land-use change, and Waste.

The platform comprises notable civil society groups in the climate and energy space in India- Council on Energy, Environment and Water (CEEW), Center for Study of Science, Technology and Policy (CSTEP), ICLEI Local Governments for Sustainability-South Asia, Shakti Sustainable Energy Foundation, Vasudha Foundation and World Resources Institute-India.

Introduction: What does industry represents?



Industry:

- Represents **diverse** set of manufacturing activities
- Accounts for **~25%** of India's overall GHG emissions
- **Offers** opportunity for **deep decarbonisation** of Indian economy

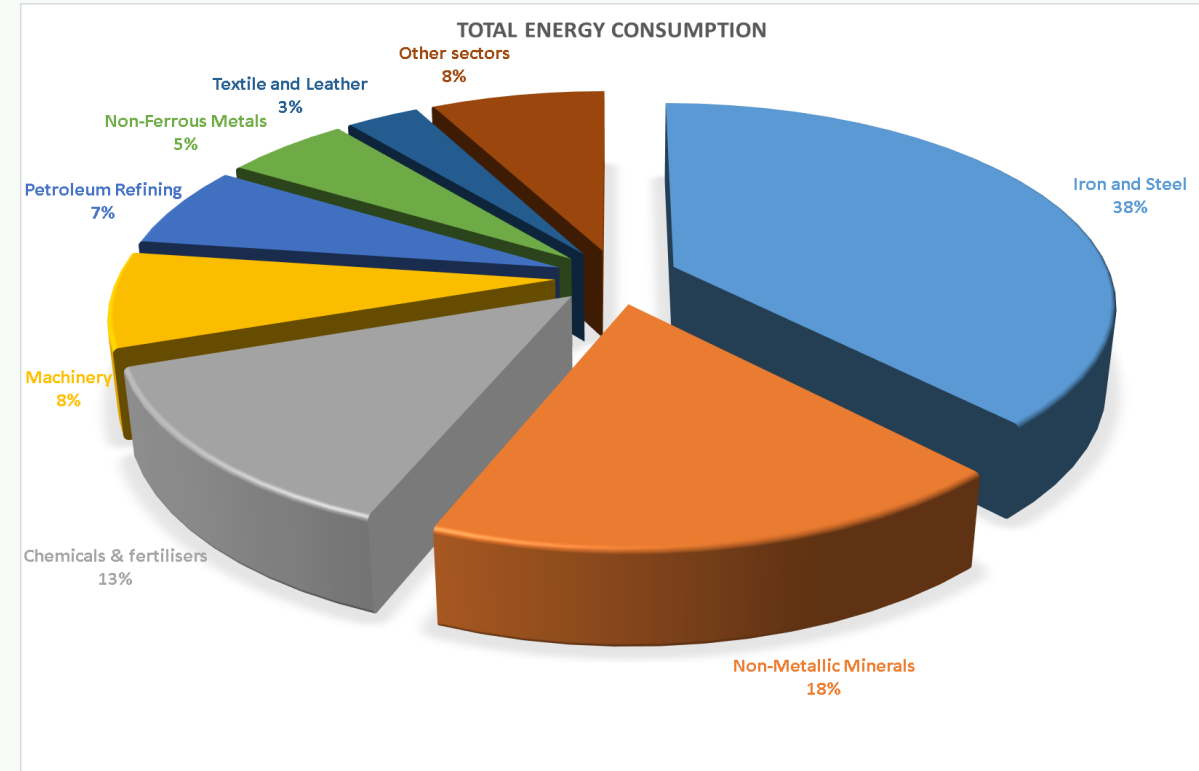
India's NDC commitment: Aims to reduce emission intensity of its GDP by 33% to 35% by 2030 (from 2005 levels)

In contrast to

Also, India has ambition to raise Manufacturing base under the '**Make in India**' plans

Decarbonisation looks challenging!

How must the industrial transition be managed to as to move towards a lower GHG intensity pathway?





Introduction: Objective and Scope of industrial estimates

Scope and coverage: (As per IPCC guidelines)

- A. Energy Industries:** Petroleum refining – 1A1b; Manufacturing of Solid fuels – 1A1ci; Mining & Hydrocarbon extraction – 1A1cii
- B. Manufacturing industries:** 1A2a to 1A2m
- C. Industrial processes and product use emissions:** 2A, 2B, 2C, 2D & 2H

Exclusions

- **Manufacturing Industries:** Construction (1A2k);
- **IPPU:** Fluorochemical production (2B9), Electronics (2E), Refrigerants (2F), and Electrical products (2G)
- Emissions due to F-gases

Tiers of emission factor reporting

- **Tier I** : Using global/regional average values
- **Tier II** : Using national level understanding on fuels and general industrial processes
- **Tier III** : Most granular form of information available at the level of individual factory level.



Primarily Annual Survey of Industries (ASI) – covers 63% to 68% of our estimates

Energy use emissions

- **Petroleum refining** – Indian PNG stats (2005-13)
- **Solid fuel manufacturing** – ASI (2005-13)
- **Other energy industries**
 - Natural gas extraction – Indian PNG stats (2005-13)
 - Coal mining – using specific diesel consumption from CIL annual report 2006-07
- **Fuel consumption in manufacturing industries** – ASI (2005-13)

IPPU emissions

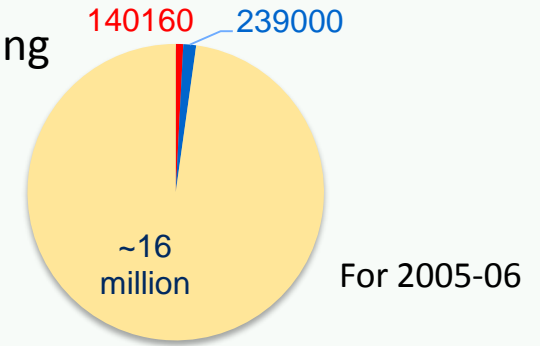
- **Cement production** – CMA (2006-08); IBM Mineral Yearbook (2008-13)
- **Lime and glass production** – ASI (2005-13)
- **Ammonia and nitric acid production** – ASI (2005-13)
- **Other chemicals production** – Annual Report-Ministry of chemicals and fertilizers (2006-13)
- **Iron & Steel and ferro alloys production** – ASI (2005-13)
- **Aluminium production** – MCX India (2006-09); IBM Mineral Yearbook (2009-13)
- **Lead & Zinc production** – IBM lead & zinc market survey report (2006-08); IBM Mineral Yearbook (2008-13)
- **Non-energy product use**
 - Lubricant use – ASI (2005-13)
 - Paraffin use – ASI (2005-13)



Data Coverage (1/2)

- ASI – comprehensive, periodic (annual), covers majority of formal sector of manufacturing

- What's left out from ASI?
 - Unregistered firm: ~ 17 million



How does this compares with National energy statistics (Industry)?

Total energy use from ASI (bottom up) **equates reasonably well** with the national energy statistics (for industries, top down)

Year	All values in MTOE			% deviation with NITI
	Ministry sources	CEEW Estimate	NITI AAYOG	
2005-06	75	64	85	33%
2006-07	86	74	94	26%
2007-08	92	93	100	8%
2008-09	99	95	112	19%
2009-10	110	116	116	0%
2010-11	115	120	113	-6%
2011-12	146	127	125	-2%
2012-13	179	145	141	-3%
2013-14	191	154	153	-1%

- Inconsistencies within public sources of data
- Data on imported fuels intake from industry is not clear from national records
- In recent years NITI Aayog's data portal indicates more alignment with ASI

Data Coverage (2/2)



Advantages:

- **Economy wide coverage** at state and sectoral level
- **Mix of census and survey**
 - **Survey** represented ~ **93% of emissions** in 2013
- Captures reporting on **80+ fuel variants**
- Separate reporting for **imported and domestic fuel** inputs
- **Separately reports captive power generation**, hence easy to avoid duplicity in reporting

Disadvantages:

- **Does not separate Fuel and Feedstock use** of energy inputs
- **Certain firms reports only expenditure on liquid fuel**, does not specify quantity and variant of liquid fuel
- Few **cases of erroneous reporting of fuel rates**
- Sizable amount of **expenses in other fuels** – ASI considers them to be largely ‘bio-fuel’ which is net carbon-neutral

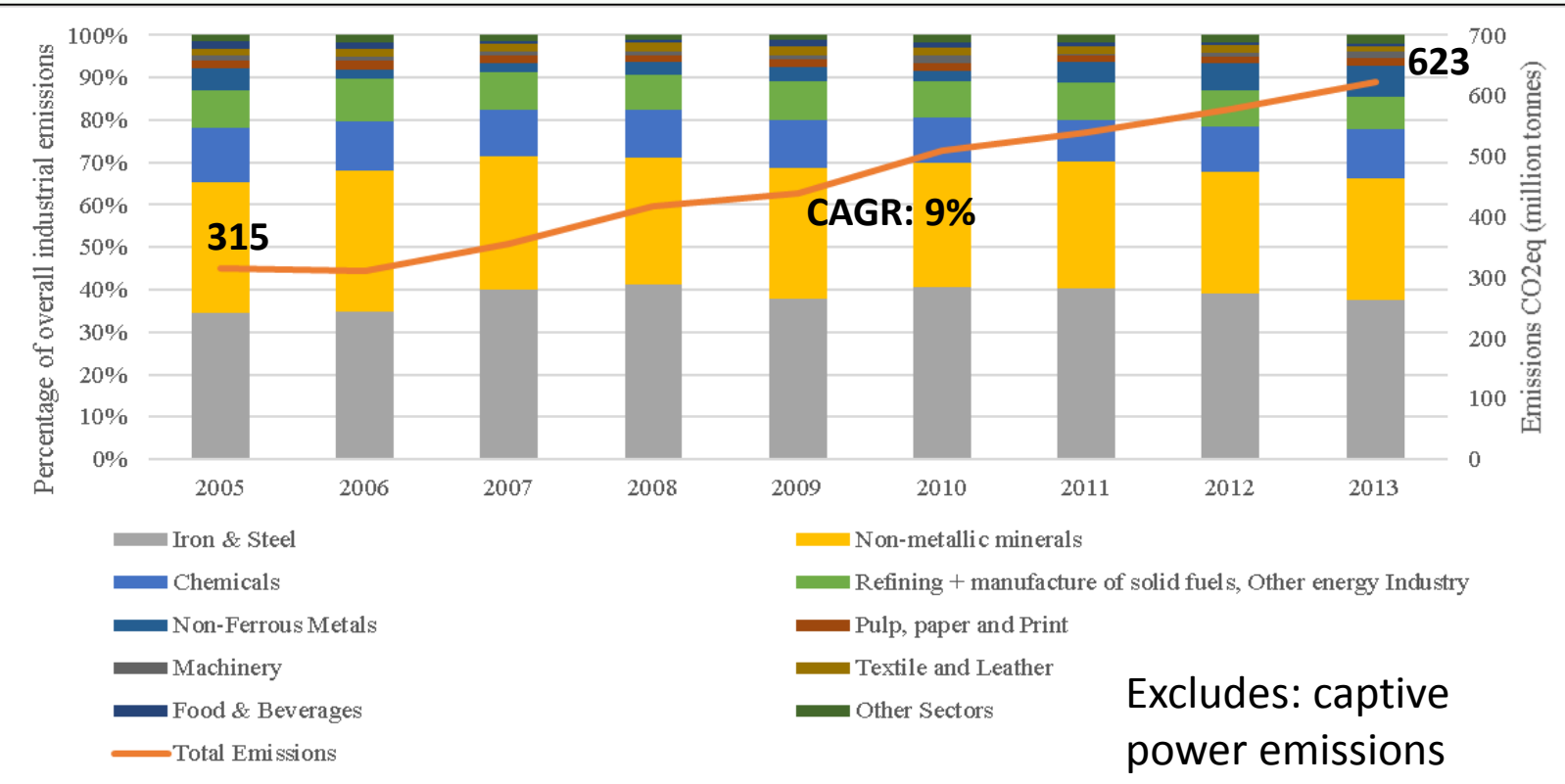
We have provided a comprehensive feedback to MOSPI on our experience with the use of ASI statistics.

Recent developments: ASI has already **shifted to the online recordkeeping mode** for the round conducted in 2013-14. This means better quality checks and more reliable statistics are only around the corner!



Findings: Sectoral split and growth in emissions

Year on year growth of GHG emissions and dominant sectors



Major contributors (2013):
Iron and Steel: 38%
Non-metallic (cement): 29%

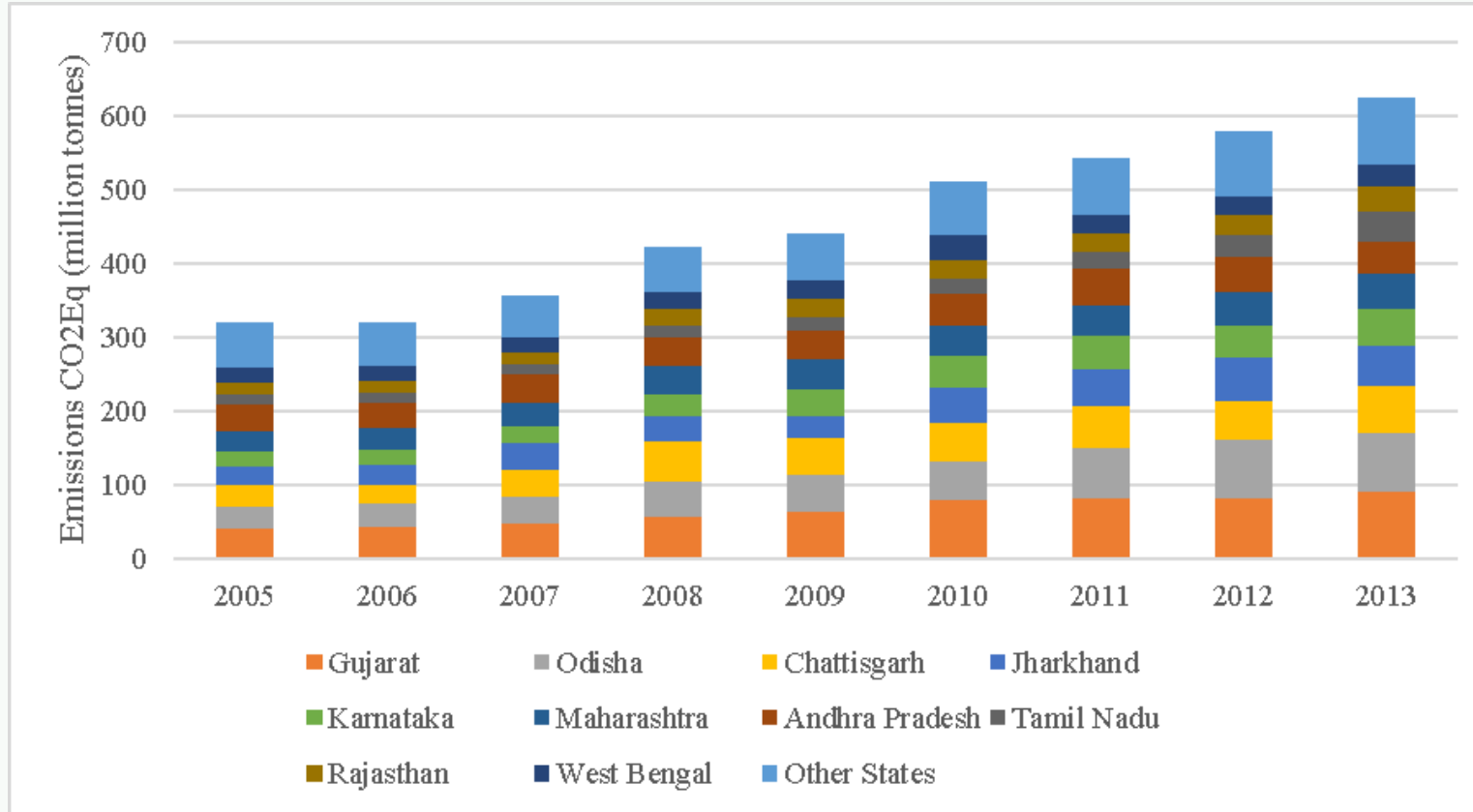
Share of energy & IPPU
Energy: 75%
IPPU: 25%

Coal: Driver of energy use emissions
Cement: Represents more than **50%** of IPPU (largely due to **limestone**)



Findings: State specific share

State wise emissions from the manufacturing sector



- Considered all states/UTs, except: Mizoram and Lakshadweep
- **10 States: ~ 85% of emission share**
 - Gujarat (14%)
 - Odisha (13%)
 - Chhattisgarh (10%)
 - Jharkhand (9%)
 - Karnataka (8%)
 - Maharashtra (8%)
 - Andhra Pradesh (7%)
 - Tamil Nadu (6%)
 - Rajasthan (5%)
 - West Bengal (5%)

- **Coal is principle source** of emission for most states
- **Gujarat** alone expends **23% of Natural gas**, and, **12% of petroleum fuels** demand of Industries in India



Findings: Growth and emission drivers within states

Percentage change in the industrial value addition share within the states

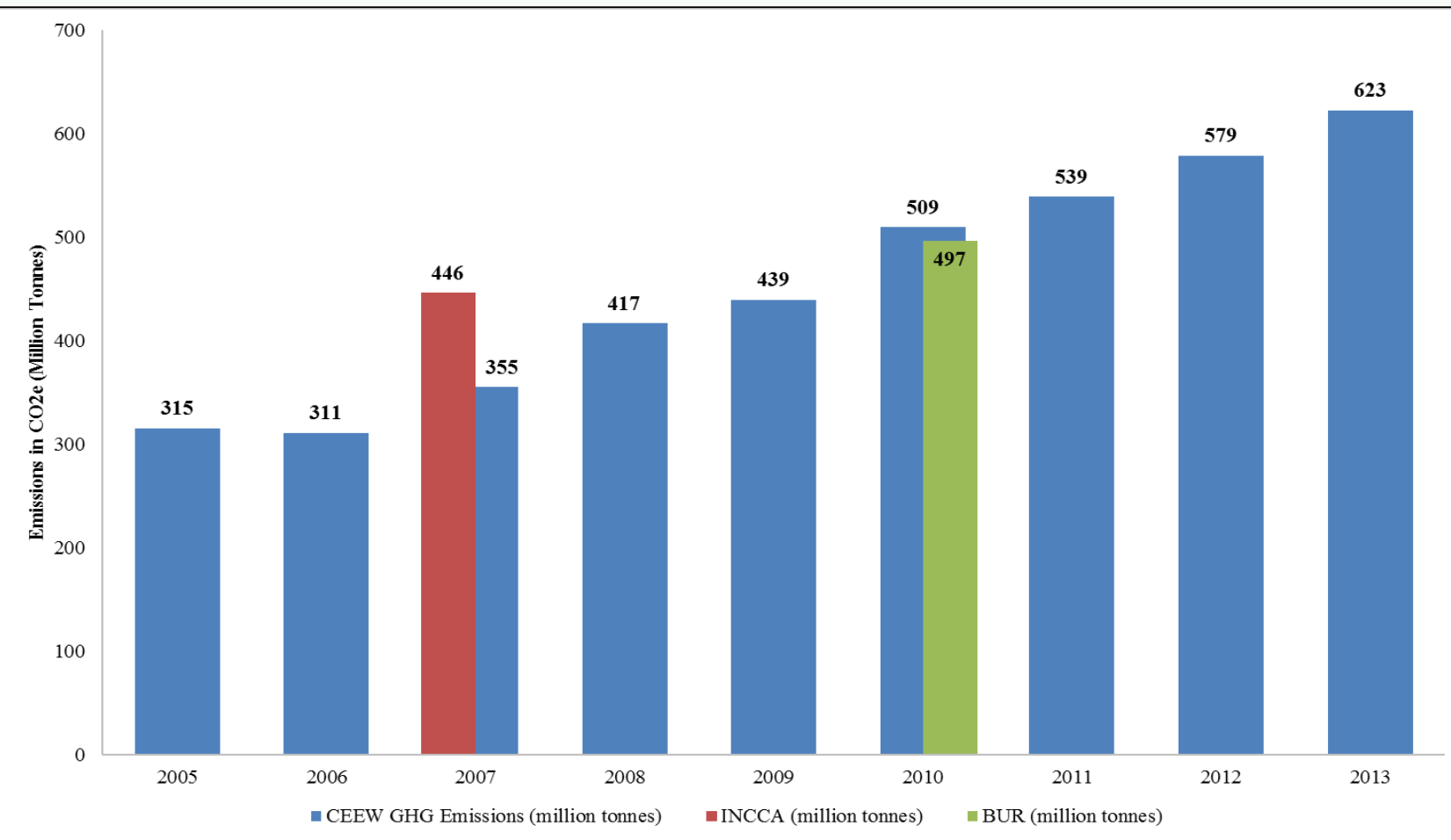
State	Iron	Cement	Chemicals	Refinery	Aluminium	Textile	Paper
Gujarat	↑ 57%	↓ -13%	↓ -7%	↑ 18%	↑ 33%	↓ -1%	↑ 42%
Odisha	↑ 24%	↓ 2%	↑ 46%		↓ -3%		↑ 24%
Chhattisgarh	↑ 59%	↑ 38%			↓ -22%		
Jharkhand	↓ -27%	↑ 130%					
Karnataka	↓ -61%	↓ -25%	↑ 52%	↓ -58%	↓ -20%	↓ -17%	↑ 40%
Maharashtra	↑ 5%	↑ 8%	↑ 6%	↓ 0%	↑ 50%	↓ -18%	↓ -23%
Tamil Nadu	↓ -8%	↓ -13%	↑ 26%	↓ -52%	↑ 107%	↓ -5%	↑ 14%
Andhra Pradesh	↓ -5%	↑ 6%	↓ -11%			↓ -9%	↑ 21%
West Bengal	↓ -4%		↓ -58%		↓ -46%	↓ -2%	↓ -16%
Uttar Pradesh	↑ 55%		↑ 16%		↓ -13%	↓ -18%	↑ 8%
Rajasthan		↑ 14%	↑ 2%		↑ 20%	↑ 6%	
Madhya Pradesh		↓ -13%	↑ 10%			↓ 1%	↓ -28%

These sectors = 90% of industry energy demand

Growth and emission Drivers:

- Gujarat: Expansion of all sectors
- Odisha: Iron, Chemicals, Paper
- Chhattisgarh: Iron and Cement
- Jharkhand : Cement Industry
- Karnataka: Chemicals and Paper
- Tamil Nadu: Aluminium

Findings: Comparison with National reporting (INCCA: 2007 and BUR:2010)



Observations:

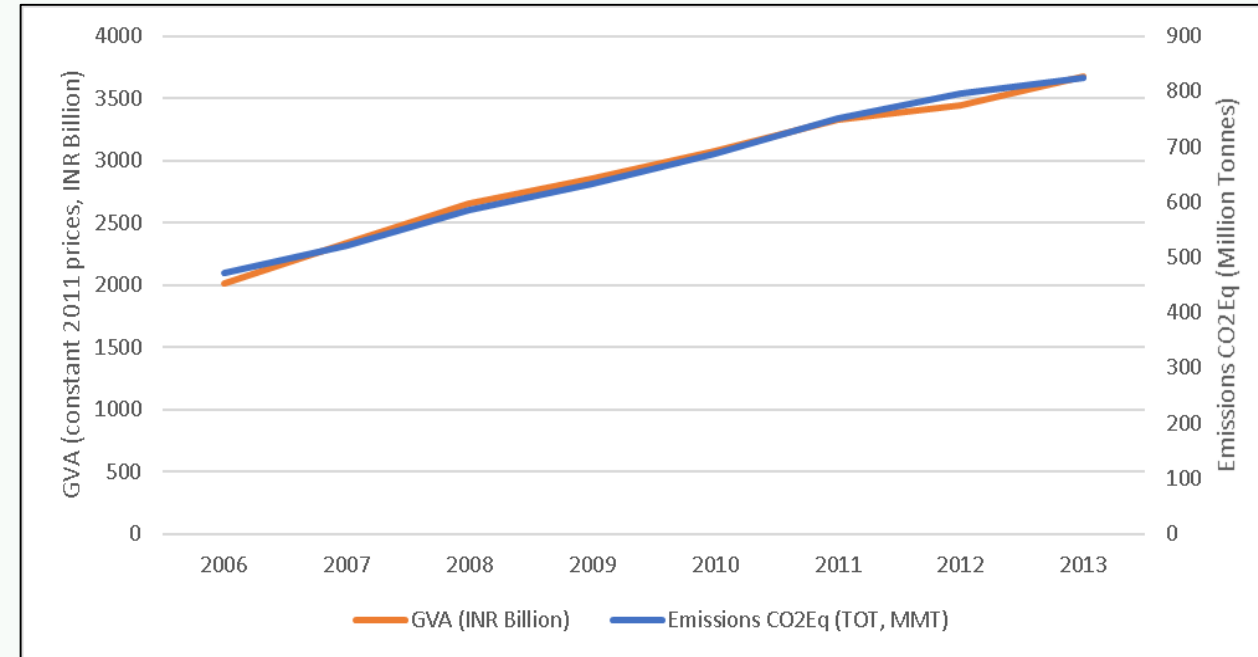
- Huge disparity for 2007 – INCCA is not an official UNFCCC submission, lack clarity
- BUR: Marginal deviation (~3%)

Note: We have not included 36 MT CO₂e of F-gases based emissions from IPPU in BUR; out of scope



Takeaways (1/2)

- **No significant decoupling between Industrial emissions and GVA contributed.**
 - Although, considering captive and grid electricity intake, an intensity reduction of 15% has been achieved!
- **Chhattisgarh** and **Odisha** have **huge scope of energy intensity reduction** from **Iron & Steel** and **Cement** Manufacturing; State must use benchmarks set by leading performers in each sector.
- Concerted natural gas infrastructure planning and a favourable price regime resulted increasing the penetration of natural gas in Gujarat, Maharashtra, and Uttar Pradesh. This needs to be taken up pan-India
- Technology upgradation is another big driver which need to be implemented in many states





Takeaways (2/2)

- **Data:** Collective efforts from all relevant ministries (Coal, Power, MOPNG, MOSPI) and civil society groups is needed to improve energy statistics reporting within country. A top-down and bottom-up matching certainly suffice this requirement

Sub-national level estimates will be highly useful in:

- ✓ Identifying: sectors, sources, and activities, within the states , which are responsible for GHG emissions
- ✓ Understanding emission trends, and establish a basis for developing an action plan
- ✓ Quantifying the benefits of activities that reduce emissions
- ✓ Tracking progress of emission reduction, hence contributes to the MRV (transparency) process
- ✓ Setting goals and targets for the future through a rational approach
- ✓ Engaging local bodies and state specific industries in a more effective manner to regulate emissions



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