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Communities
what's possible

Beyond the grid: Driving an economy-wide energy transformation by cities and industry in Asia

Energy ++: Multisectoral Approach

Asia Clean Energy Forum 2020

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Energy Transformation

Overview of an economy-wide transformation

Energy Picture in Asia

Economy-wide transformation vs Power Sector transformation

China & India Cases

Learnings & the Future

The Energy Picture

an overview of energy and industry

Climate Imperative for an Energy Transformation

- The IPCC Special Report on Global Warming Impact of 1.5 degrees says at the present rate of warming, global temperatures are projected to reach 1.5°C around 2040.
- Limiting Global Warming to 1.5°C Depends on Limiting Both Cumulative CO₂ emissions and Future Non-CO₂ Emissions
- Pathways that limit global warming to 1.5°C, most of which still involve overshoot, require significant changes in four systems: energy, land use and ecosystems, urban and infrastructure, and industry.¹ (IPCC SR 1.5, Ch4, Section 4.3.1)

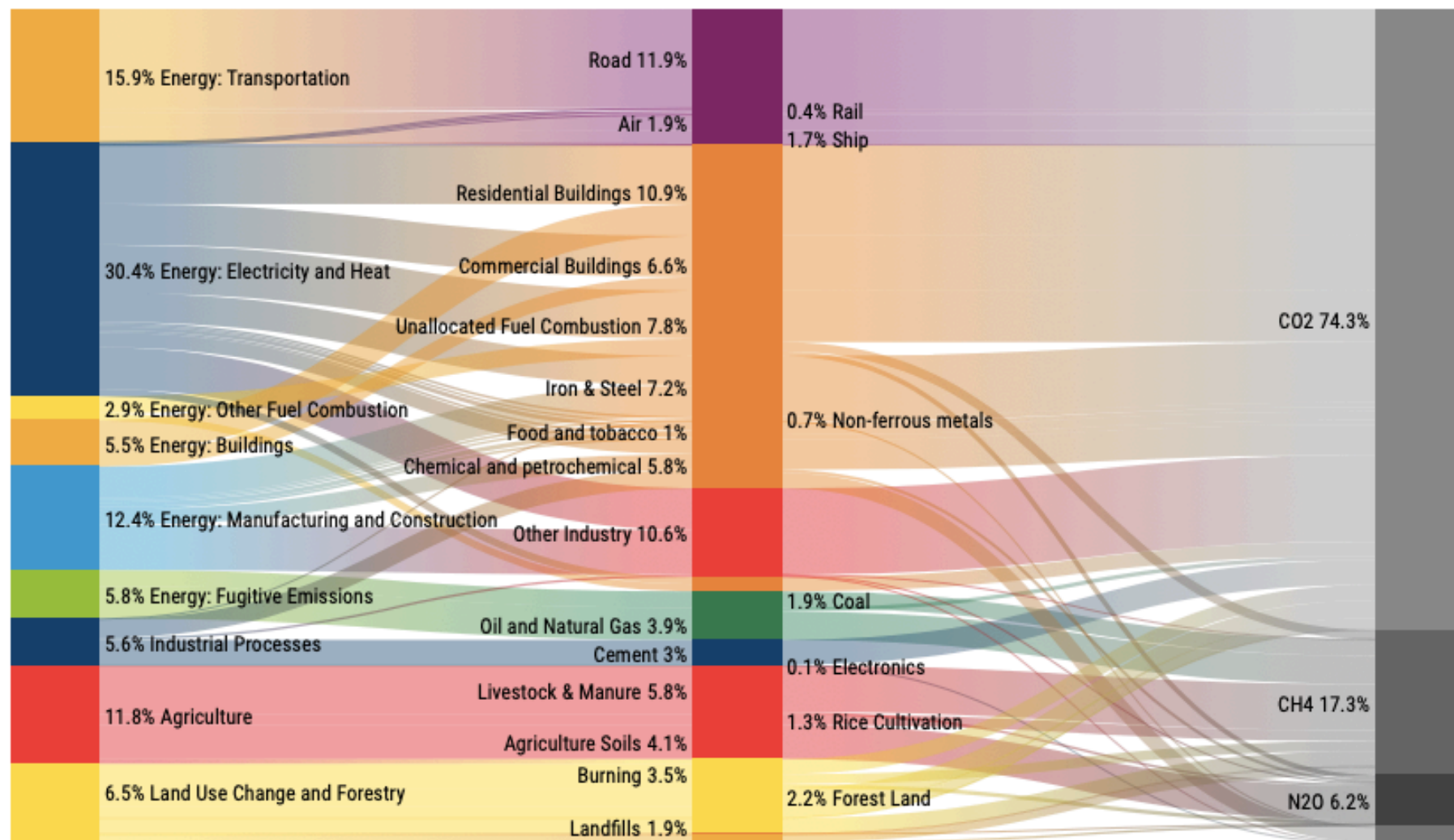
Energy System

Switching to low-carbon energy sources – mostly by decarbonising power and electrifying a broader set of economic activities, first in buildings and light-duty urban transport, and then in heavy-duty transport and industry – could deliver roughly two-thirds of the carbon emissions reduction required from the energy sector by 2040 to meet a 2°C trajectory; energy efficiency improvements could contribute the remaining third, according to the Energy Transitions Commission.² (New Climate Economy)

Global GHG Emissions (pre-covid-19)

World Greenhouse Gas Emissions in 2016 (Sector | End Use | Gas)

Total: 49.4 GtCO₂e

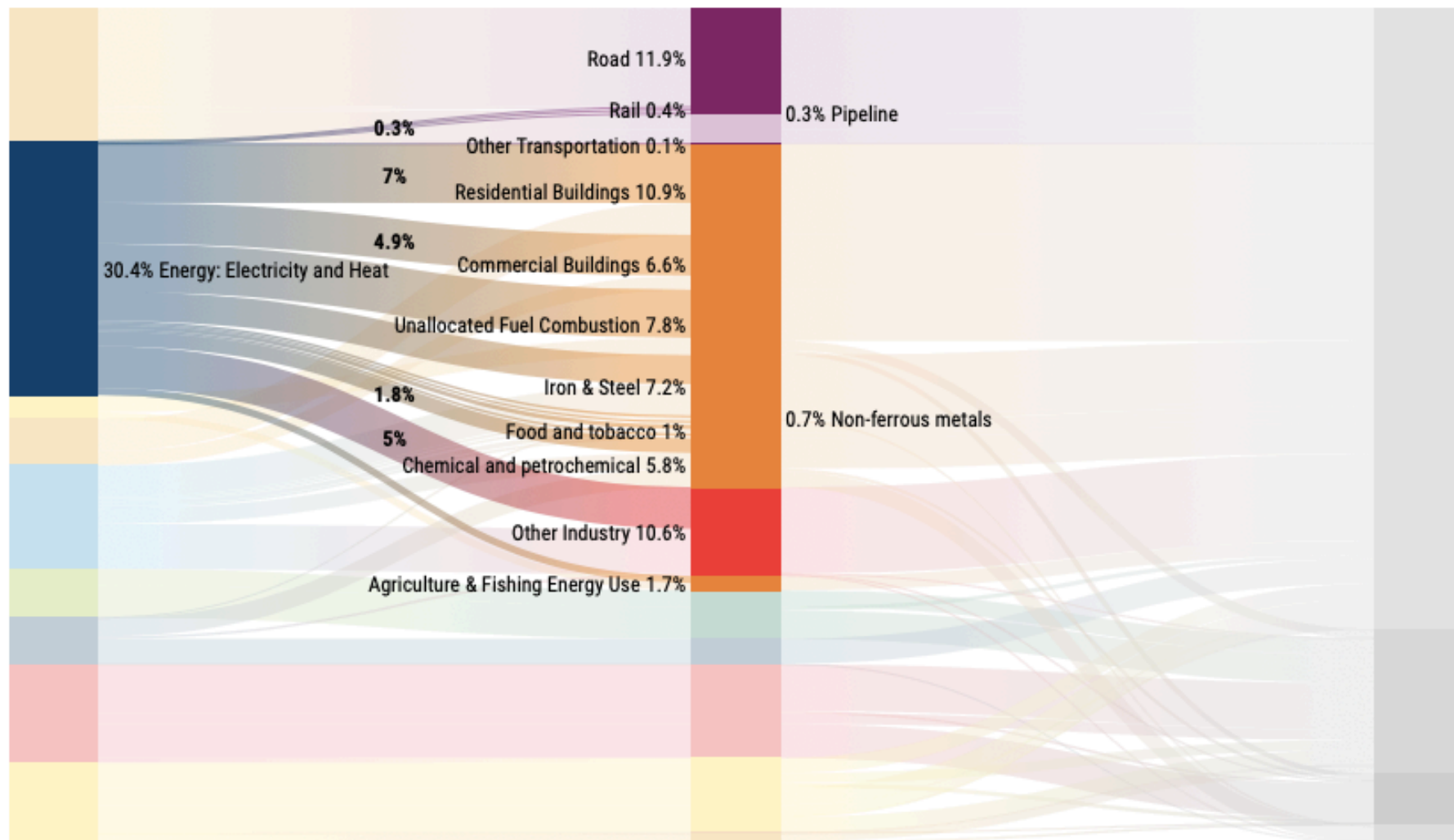


Source: [Climate Watch](https://www.climatewatch.org/), based on raw data from IEA (2018), CO₂ Emissions from Fuel Combustion, www.iea.org/statistics/; modified by WRI.

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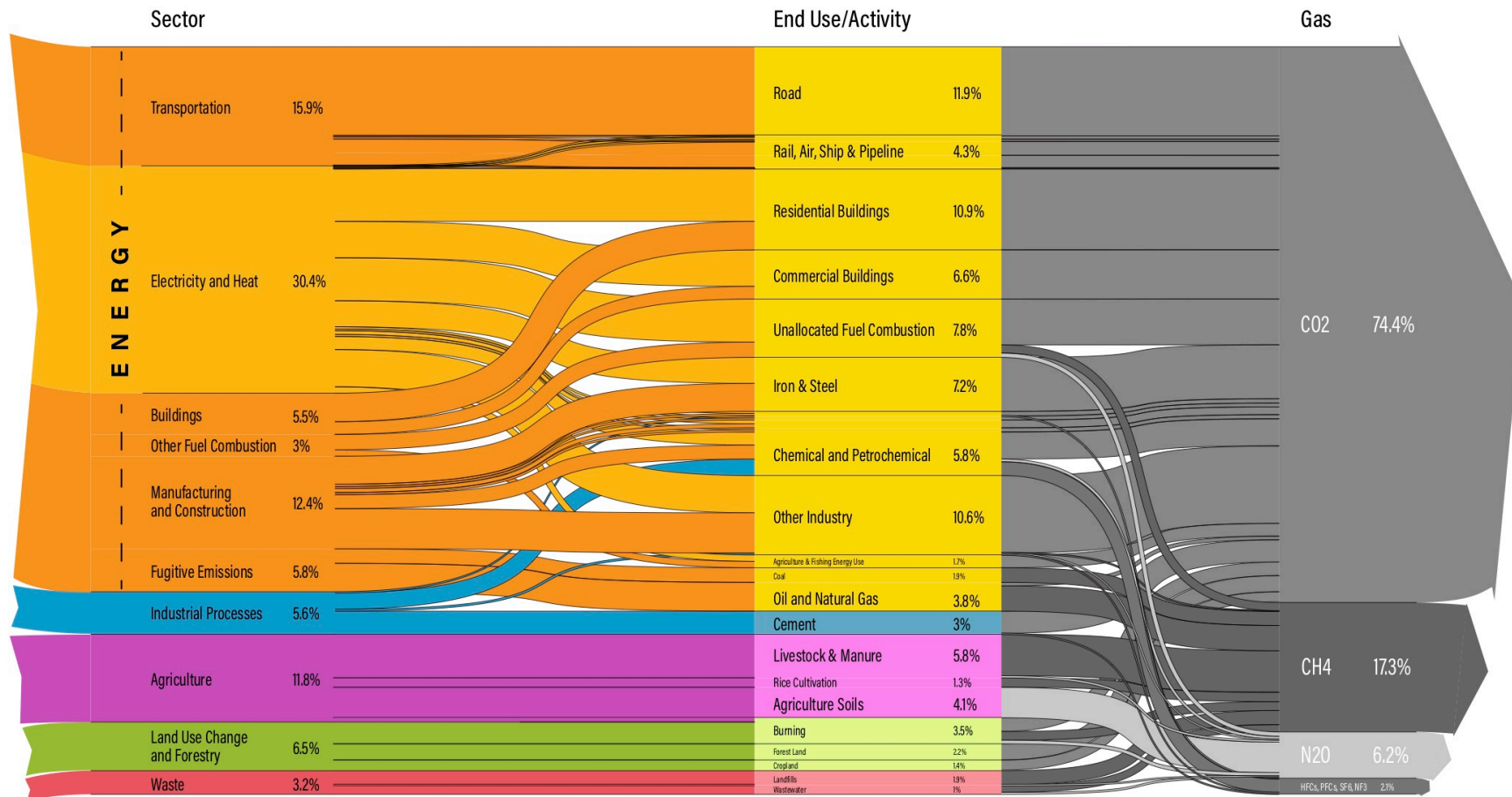


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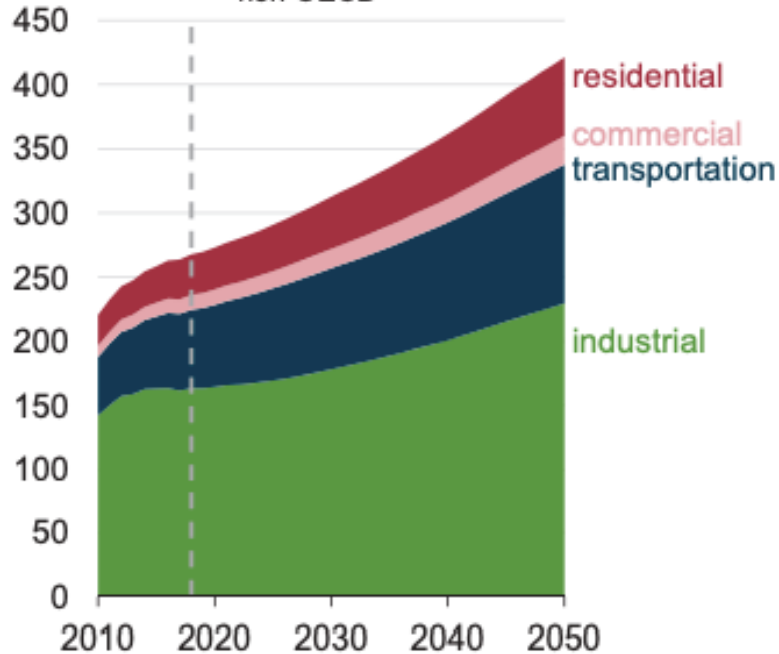
Global Energy Consumption – Industry

The Industrial Sector is the largest consumer of energy @ more than half of global consumption

~50% from energy-intensive industry
~38% from non-energy intensive industry

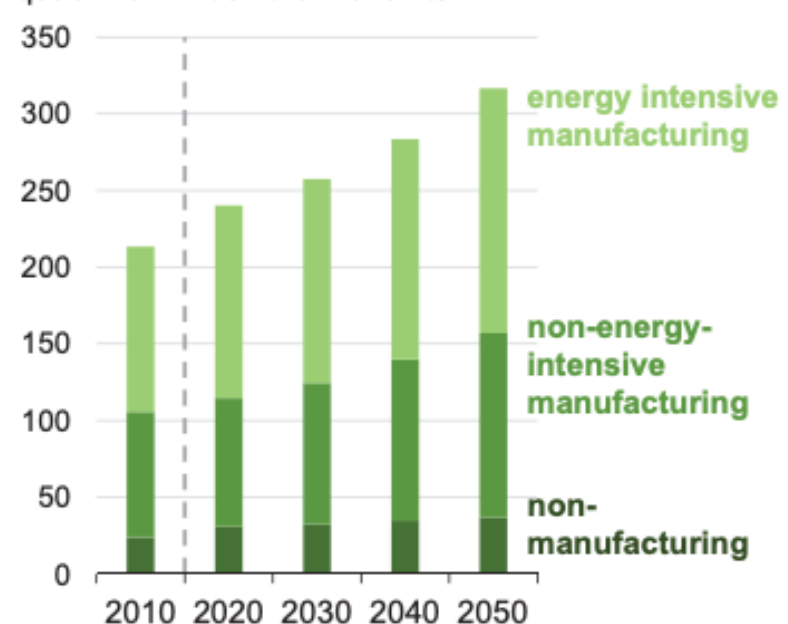
Energy consumption by sector

quadrillion British thermal units
non-OECD



Energy consumption by industrial subsector, world

quadrillion British thermal units



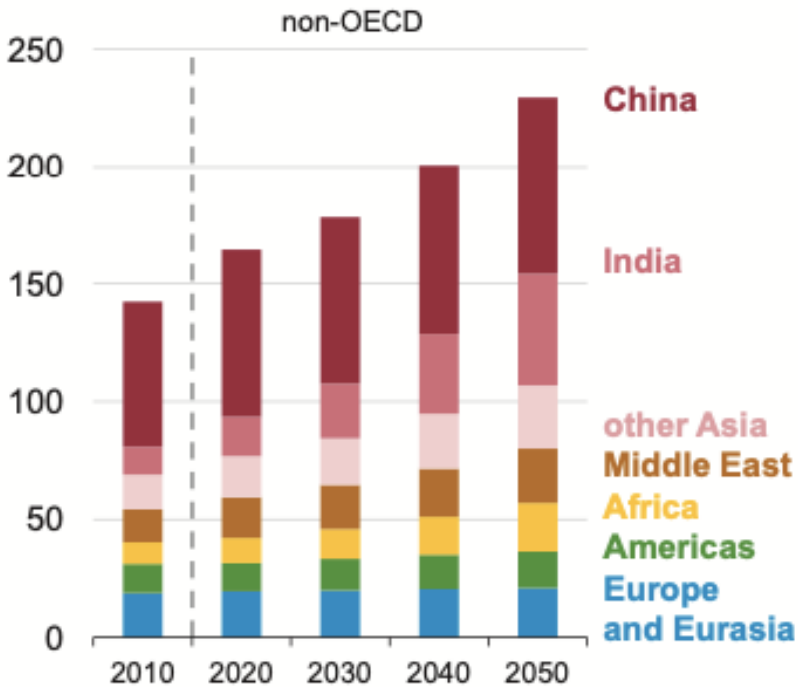
U.S. Energy Information Administration

#IEO2019

www.eia.gov/ieo

Asia Energy Consumption – Industry

Industrial energy consumption
quadrillion British thermal units



U.S. Energy Information Administration

#IEO2019 | www.eia.gov/ieo

Asia is biggest growth region for both energy (electricity) and industrial energy consumption

China – world's largest industrial energy user @ 29% in 2018

- 24% in 2050 (projected)

India – world's largest industrial energy growth

- Energy consumption will grow 3.4% a year
- Growth in energy from 2018-2050 represents 40% of total world increase

China: Driving Low Emissions in Cities

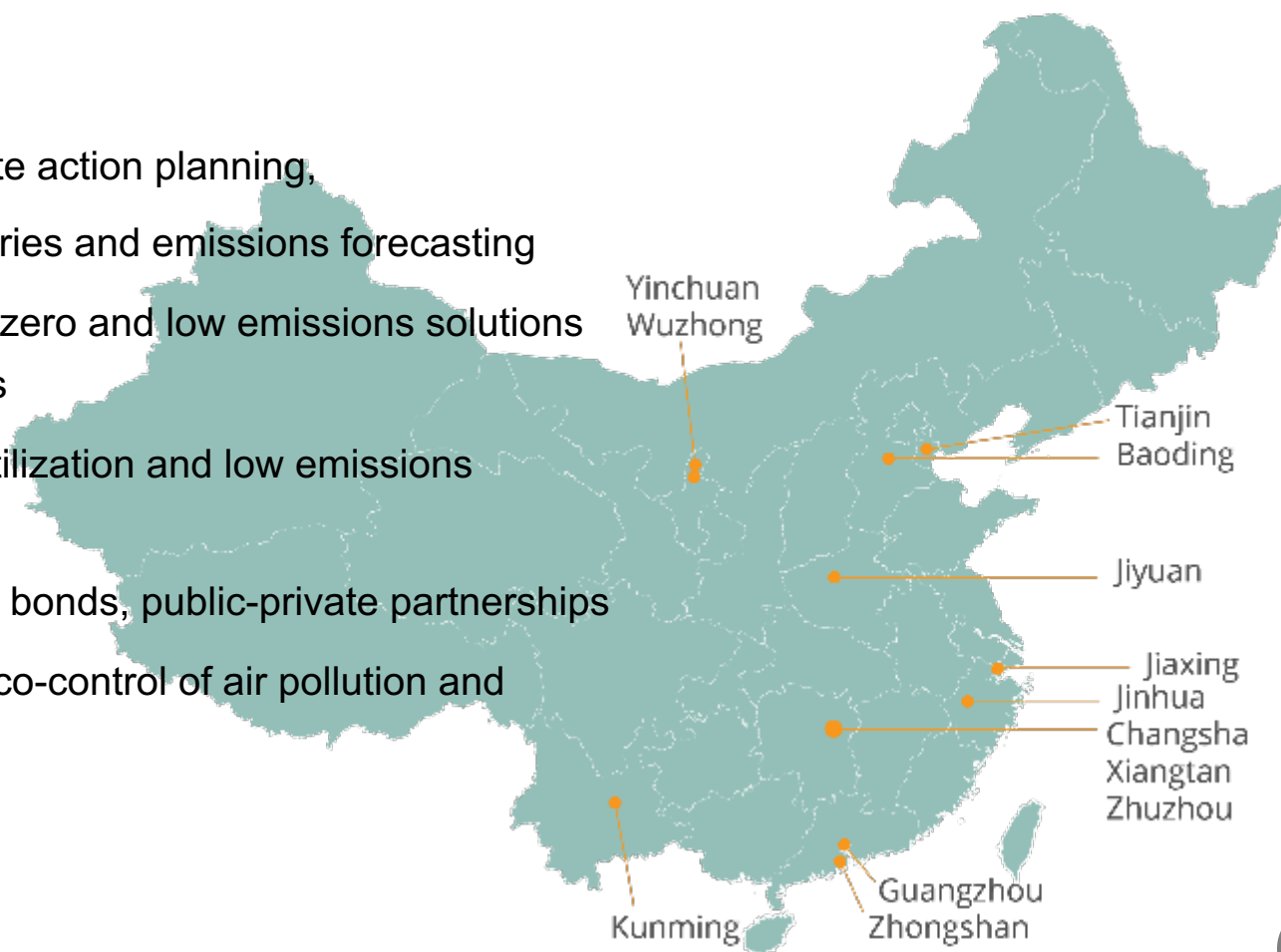
an overview

Low Emissions Cities Alliance

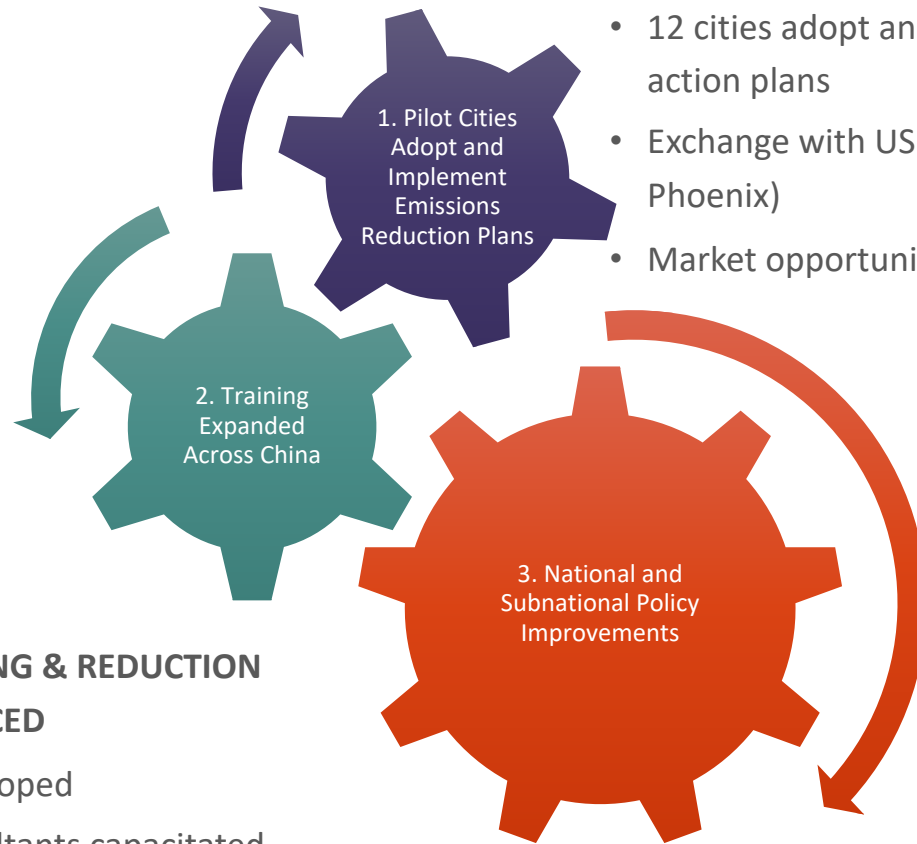
Strengthening Low-Emissions Development Through Building Capacity and Pathways to Emissions Reductions in Chinese Cities

Areas of Activity:

- Science-based climate action planning, including GHG inventories and emissions forecasting
- Green building, near-zero and low emissions solutions for cities and industries
- Renewable energy utilization and low emissions technology
- Green finance, green bonds, public-private partnerships
- Green transport and co-control of air pollution and GHGs
- Sustainable land use



LECA Three Pillars: Amplification of Results



1. CITY-LEVEL IMPACT

- 12 cities adopt and implement low GHG emissions action plans
- Exchange with US cities (e.g. Houston, Cleveland, Phoenix)
- Market opportunities for US businesses created

2. EMISSIONS PEAKING & REDUCTION CAPACITY ENHANCED

- ToT curricula developed
- Trainers and consultants capacitated
- Integration with major national programs including APPC

3. NATIONAL-LEVEL IMPACT

- Low emissions laws, policies and standards promoted
- Case studies and best practices developed from pilot cities and disseminated via partners and peer learning
- Adoption of learnings at national scale

Training Approach



Knowledge & Capacity Building Platform

Cities



- City Emission Peaking Roadmap & Action Plan (CEPRA)
- Plan-Implementation gap needs practicality

Industry



- Beyond benchmarking city-industry low emissions collaboration

Regions



- Driving scale and collective action between cities, communities, and regional institutions

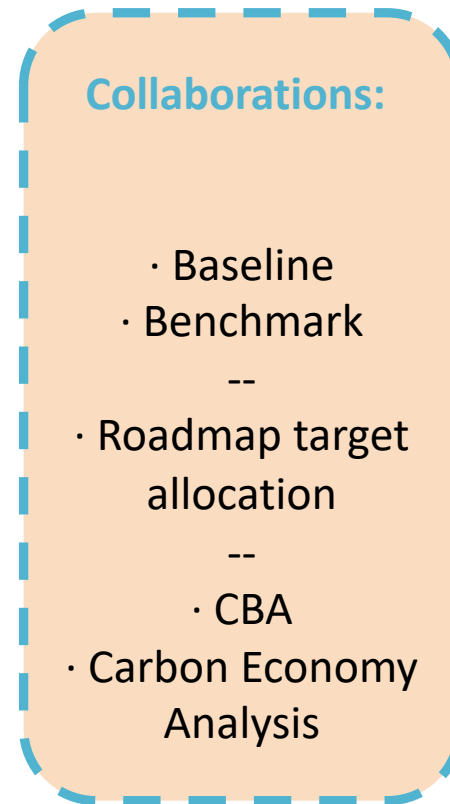
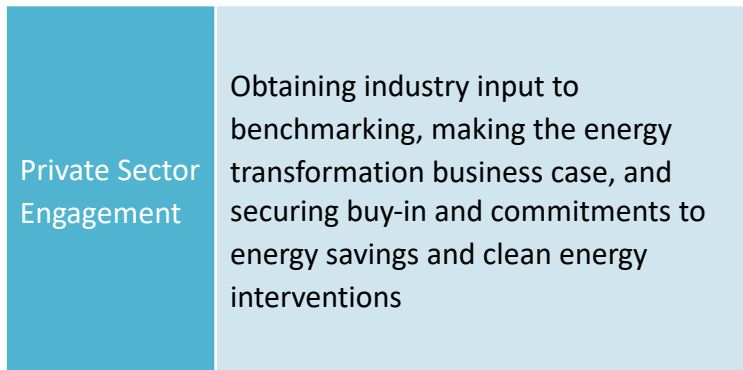
HOW

Data Driven & Case Based Technical Assistance

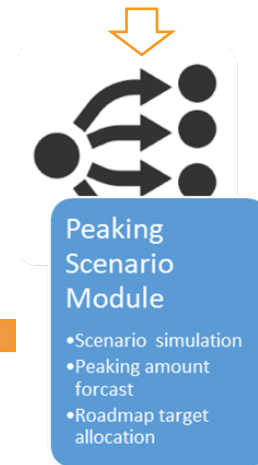
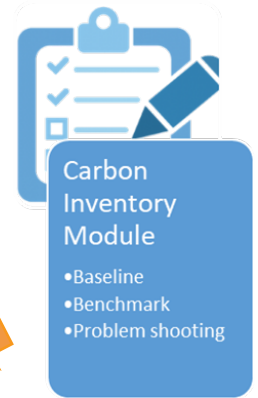
Demonstrating What Works by Peer Learning

Adapting, Sharing and Replicating

Xiangtan City – Early Peaking 2.0



STEPS TO DESIGNING A CITY GHG PEAK ROADMAP



Xiangtan City – Early Peaking 2.0

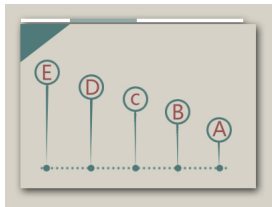
Beyond Planning – Launching City Implementation

Active engagement in post-planning activities:

- Formal ratification as policy, incorporation into city targets
- Engagement with of financing partners / PPPs
- Mobilization of key external stakeholder e.g. local private sector / SOEs
- Capacitating local think-tanks and local ToT partners to backstop implementation

IMPLEMENTATION PREPARATION	EXAMPLES
Barrier & Gap Resolution	Integrating political economy considerations, and accommodating competing priorities and interests
Private Sector Engagement	Obtaining industry input to benchmarking, making the energy transformation business case, and securing buy-in and commitments to energy savings and clean energy interventions
Advancement of Social Well-being	Integrating equity/inclusion issues into projects to promote social well-being (solar PV for poverty alleviation, community transport, cost-friendly natural gas initiatives, affordable green building retrofits)
Project-Based Carbon Economy Analysis	Balancing of GHG reduction targets with economic development goals, policy implications, ROI, resource allocation, technology and financing options
Project Finance	Advancing market-based financing scheme development, responsible investing incentive structures, PPPs, and access to green finance
Performance Management Metrics	Facilitating implementation and driving continuous improvement via tools for city department managers to assess performance and allow course-correction

Xiangtan: City Climate Action Roadmap



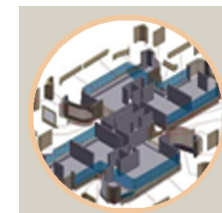
Improve energy efficiency



1. Big manufacturer energy program



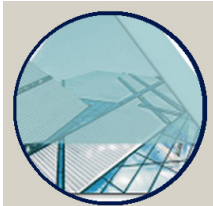
2. Large scale green building program



3. Prefabricated affordable housing program



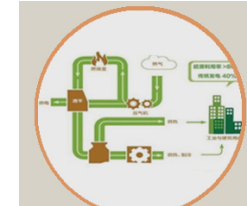
Clean energy



4. Waste to energy program



5. Zero-carbon energy program



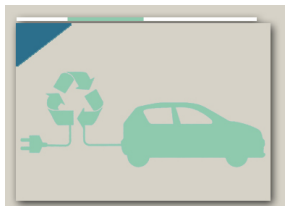
6. Natural gas for all program



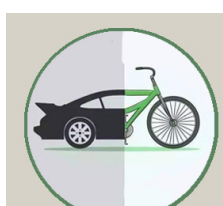
Industrial transformation



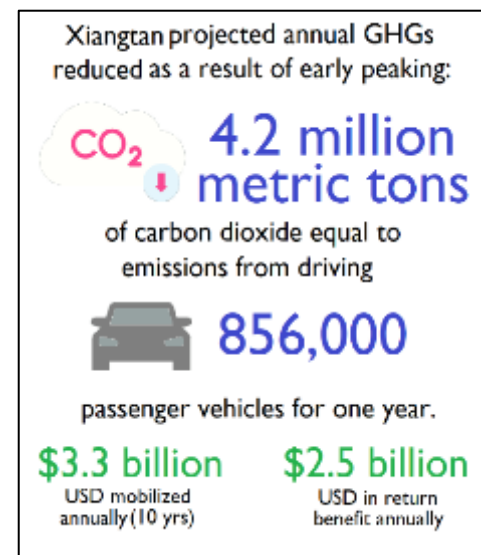
7. Green climate industry program



Low carbon transportation



8. E-mobility program



Xiangtan City – Early Peaking 2.0

Promising Practice: Public-Private Cooperation

Xiangtan work highlighted the need to engage directly with industry to ground-truth the city's benchmarks for energy and production activity and to accelerate enterprise improvement of energy performance and carbon management

- 60% of all emissions in city come from one steel company – industry engagement was critical
- Emissions reductions KPIs have been developed for the heaviest industrial emitters – ensuring accountability / coordinated action across government and business



Zhaohua bridge construction for Xiangtan ring road

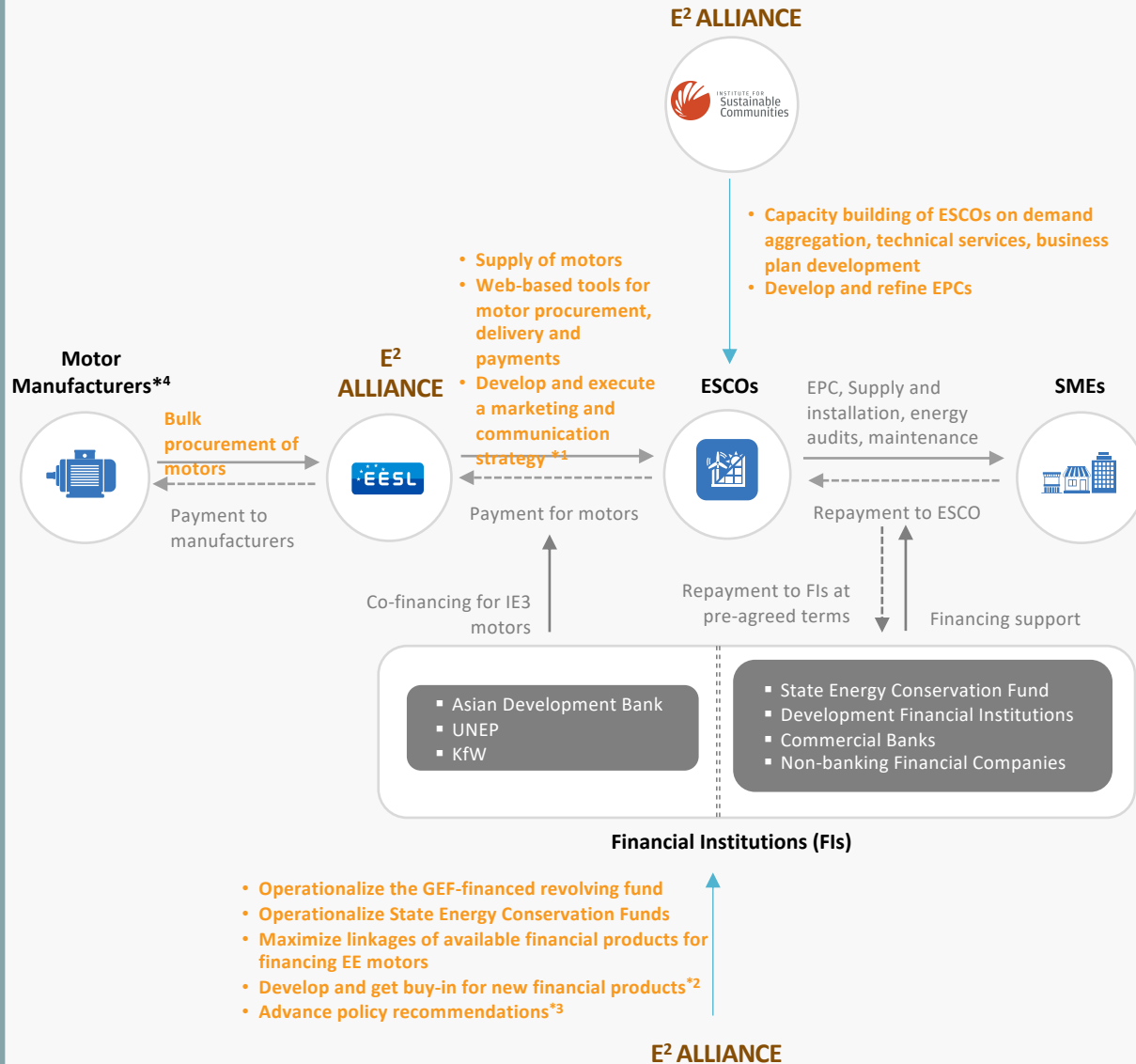
“The roadmap is of high-quality, with detailed analysis and practical suggestions of how to achieve early peaking.”

– **Huaqing Xu**, Director of National Center for Climate Change Strategy and International Cooperation (NCSC)

India: Driving Low Emissions in Industry

an overview

Implementation of E2 Model in India



Convening of key stakeholders to get their feedback and buy-in:

*1: For marketing and communications strategy for ESCOs

*2: For financial products/models

*3: For policy recommendations

*4: Ongoing engagement with motor manufacturers to advance the model

Dissemination of E2 Model in the Region

Vietnam, Bangladesh, Indonesia and the Philippines

1. Leverage WRI platforms to showcase the model*⁵
2. Establish a project working group and engage with them to elicit their input and to secure their support
3. Share the model with regional stakeholders at events such as the World Sustainable Development Summit, Asia Clean Energy Forum and other P4G platforms*⁶
4. Conduct in person meetings with relevant stakeholders to promote the model and secure support for replicating and scaling it in these countries

India E2 Model – Pilot Results

Phase 1:
120,000 IE3
Motors

Phase 2:
600,000 over 3
years

Payback period
6-15 months

Replacing 30
foot-mounted
motors in 3
clusters = 4.8M
kWh of lifetime
energy savings
and almost
\$500,000 USD

Replacing non-std or IE1
motor can result in annual
energy savings of 7-15%

Lifetime emission reduction of
4,000 MTCDE from 30 motors
replaced, equiv. to 900 cars

Table 1: Summary of the motor replacement pilot program results for foot-mounted motors

S.NO	DESCRIPTION	UNIT	SURAT TEXTILE CLUSTER	JAMNAGAR BRASS CLUSTER	AHMEDABAD CHEMICAL CLUSTER
1.	Installed kW of motors (Total)	kW	97.1	51.6	85.6
2.	Power saved after installation of IE3 motor	kW	16.91	11.85	14.14
3.	Percent of power saved after installation of IE3 motor	%	17%	12%	14%
4.	Average daily operating hours	Hours	20	20	20
5.	Annual operating hours - assuming 350 days of operation in a year	Hours	6,930	6,930	6,930
6.	Annual energy saved due to installation of IE3 motor	kWh	117,199	82,121	106,691
7.	Annual cost saving @ Rs.7.00 per unit	INR	820,392	574,844	746,838
		USD	12,621	8,844	11,490
8.	Investment made for procurement and installation of motor (Total)	INR	430,361	160,000	327,562
		USD	6,620	2461.5	5039
9.	Simple payback period	Months	6.29	3.3	13.49
10.	Annual CO ₂ emission reduction ³	Ton	96.103	67.34	87.486

Synthesis & Conclusions

Synthesis & Conclusions

- To drive the energy transformation, you must get outside of the grid
- Industry is a critical lynchpin for climate and energy action – also represents more varied ecosystem of primary, secondary, and end users
- Driving stakeholder collaboration and new business models are needed to drive city and industry coherent planning.
- China LECA & India E2 models represent inroads from city and industry points

Thank You

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