

# Energy Technology Perspectives 2014

## IEA Global Industry Dialogue and Expert Review Workshop

Paris, October 7

- ETP 2014 preliminary results feedback
  - Production, energy use, fuel mix shifts
- Energy market changes and impact in
  - Fuel and feedstock mix
  - Regional production shifts
  - Regional industrial competitiveness
- Views on BATs energy intensity values
- Emerging technologies status, expected progress, potential...
  - Sector specific emerging technologies
  - CCS demonstration and deployment needs and prospects
  - Which role H2 can play in the future?
- ETP Industry model improvement → data availability
- ETP 2015 potential topic discussion → The role of industry in the climate negotiations

Source	Year	Steam cracking [GJ/t]			Ammonia [GJ/t]			Methanol [GJ/t]	
		Naphtha	Ethane	Other oil	Coal	Oil	Gas	Coal	Gas
Worrell, et al. <i>Berkeley National Laboratory</i> <sup>1</sup>	2008	11.0	12.5	-	34.8	-	28.0	-	-
IEA Information Paper "Chemical and Petrochemical Sector" <sup>2</sup>	2009	12.0	17.0	12.0	19.7	15.1	7.3	12.8	8.5
IEA/DECHEMA/ ICCA Roadmap <sup>3</sup>	2013	12.0	12.2	9.8	22.0	-	11.0	20.1	9.0

1 "World Best Practice Energy Intensity Values for Selected Industrial Sectors"

2 "Chemical and Petrochemical Sector: Potential of best practice technology and other measures for improving energy efficiency"

3 "Technology Roadmap: Energy and GHG Reductions in the Chemical Industry via Catalytic Processes"

**\*BAT values do not include petrochemical feedstock**

- Research/demonstration progress and potentials?
  - Naphtha catalytic cracking for olefin production: 10%-20% energy savings vs steam cracking
  - Methanol to Olefin route: enables olefin production from gas or coal → higher energy intensity
  - Biomass as feedstock: olefins synthesis from biomass
  - H2 from renewable sources for ammonia and methanol production

Source: Energy and GHG reductions in the Chemical Industry via Catalytic processes Technology Roadmap, IEA/ICCA/DECHEMA 2013

- 2DS 2050 CCS targets:
  - Industry: 2079 Mt CO<sub>2</sub> captured (22% of direct CO<sub>2</sub> sector emissions without capture)
  - Chemicals: 592 Mt CO<sub>2</sub> captured (22% of direct CO<sub>2</sub> sector emissions without capture)
  - IEA CCS Roadmap analyses actions to accelerate deployment

Source: Direct CO<sub>2</sub> emissions include chemical feedstock and blast furnaces and coke ovens.



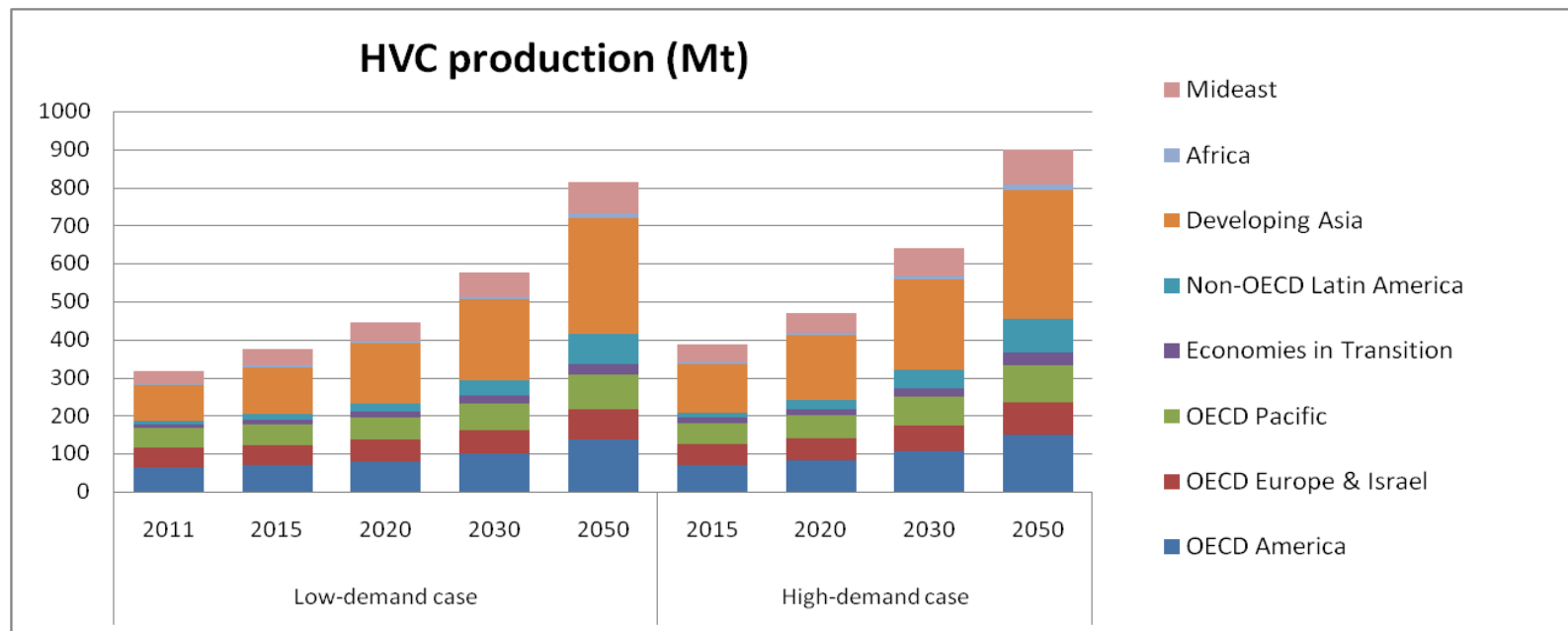
# Model improvement: data requirements

- Start conversion to a different platform, future structural changes:
  - Capacity vs production → level of capacity utilisation
  - Capacity characterization by plant size categories
  - Full segregation of energy use by process requirements, heat/elec generation (CHP) and separate heat generation
  - Separate modeling of waste heat recovery potentials
  - Segregation of biomass, waste and renewable energy sources
  - Improve technologies capital and operational costs assessment
  
- Waste heat recovery potential by sector
  - Cement industry analysis through IEA India Cement Roadmap → 550 MW existing potential

Back up slides

# HVC - Production

ETP  
2014



**Major HVC production growth**

**2050 vs 2011  
low demand**

**Developing Asia**

37%

**OECD America**

17%

**Middle East**

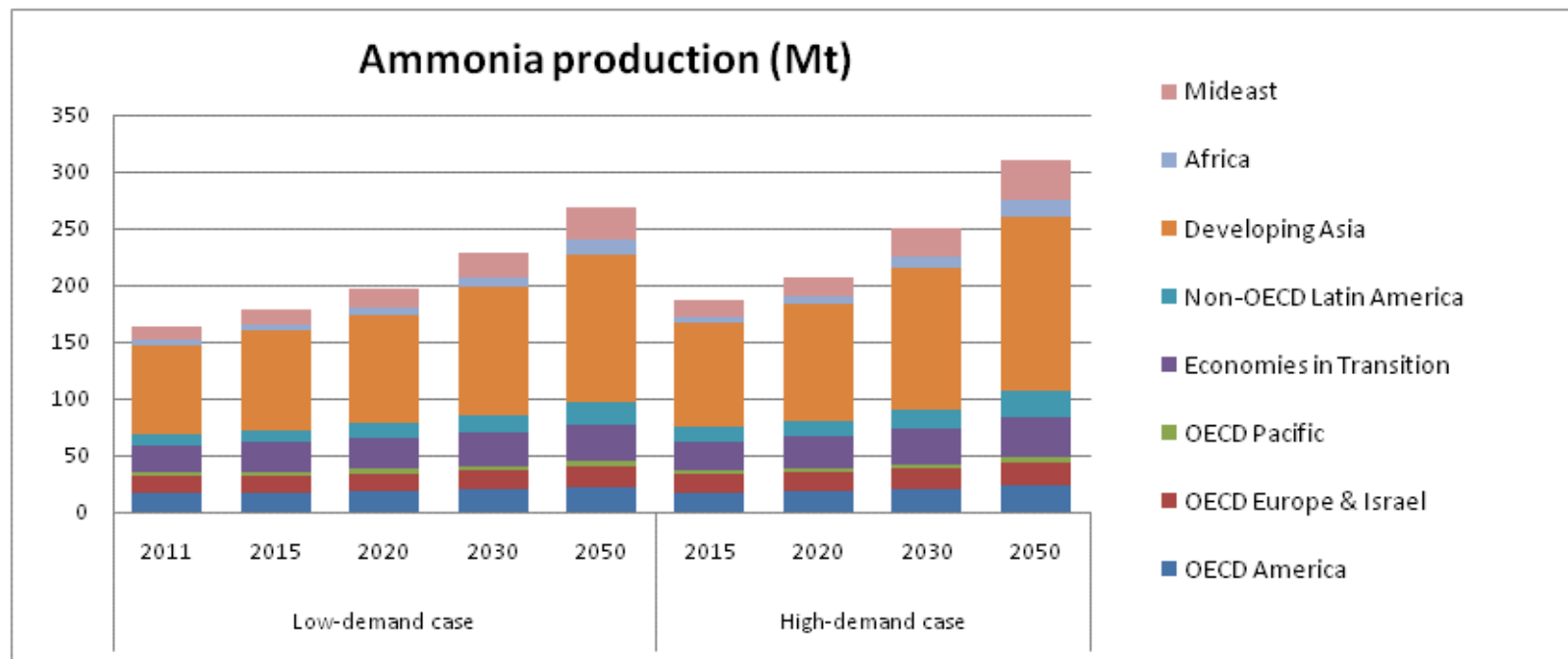
10%

Note: 6DS scenario projections. HVC projections vary depending on scenario due to different recycling rates considered.



# Ammonia - Production

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2014



**Major ammonia production growth**

**2050 vs 2011  
low demand**

**Developing Asia**

48%

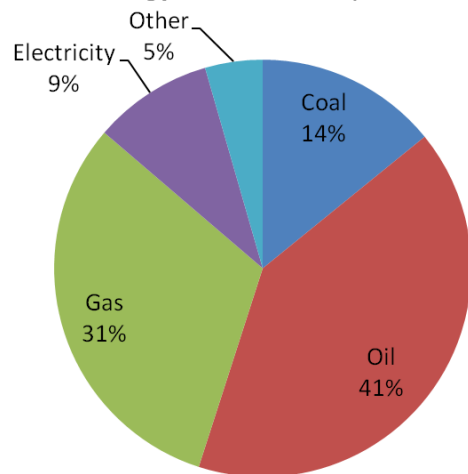
**EITs**

12%

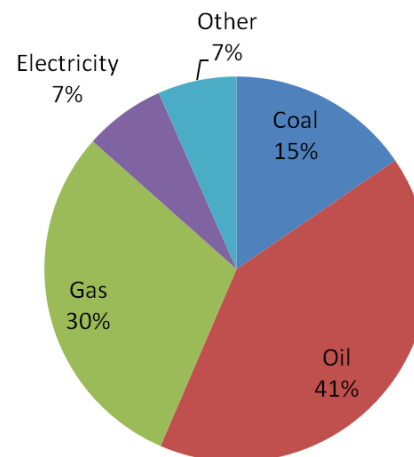
**Middle East**

10%

**Chemicals energy use 6DS 2050 (Total 2627 Mtoe)**



**Chemicals energy use 2DS 2050 (2DS) (Total 1980 Mtoe)**



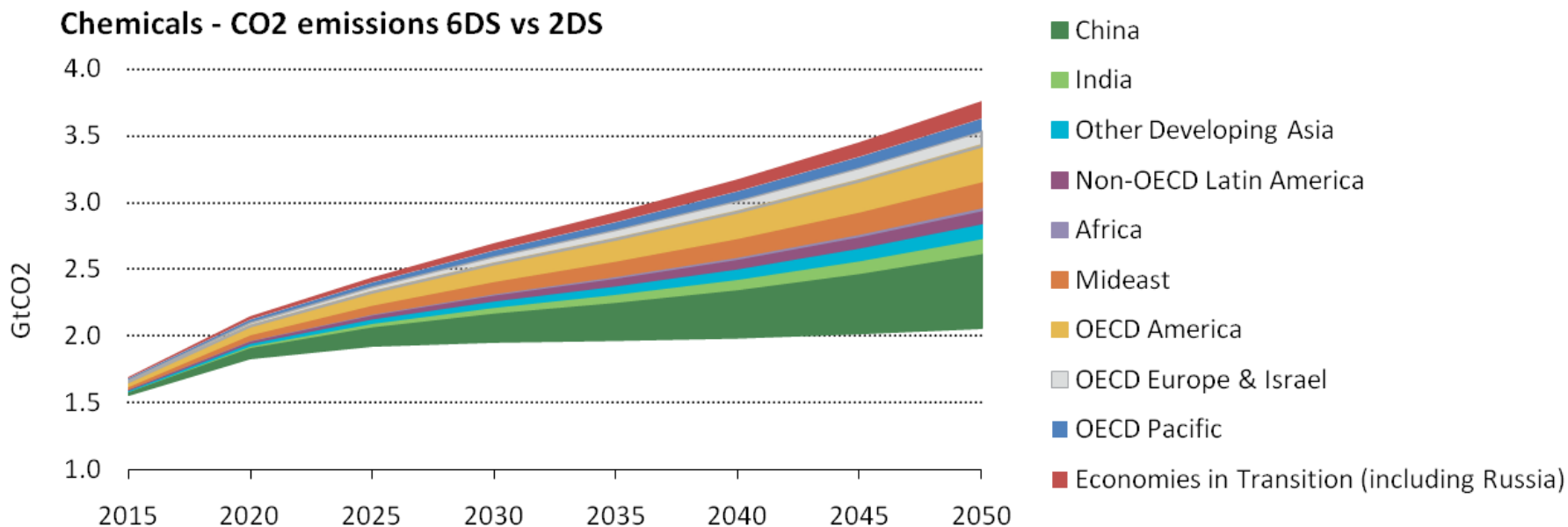
Note 1: Other includes: heat, combustible biomass, waste and other renewables.

Note 2: Energy use includes feedstock.

Note 3: Energy use refers to low demand case

# Chemicals - Direct CO<sub>2</sub> emission reductions

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2014



Major CO <sub>2</sub> emission reduction contributions	6DS vs 2DS (2050) low demand
China	33%
OECD America	16%
Middle East	11%