

# Renewable energy use in industrial within the 2DS

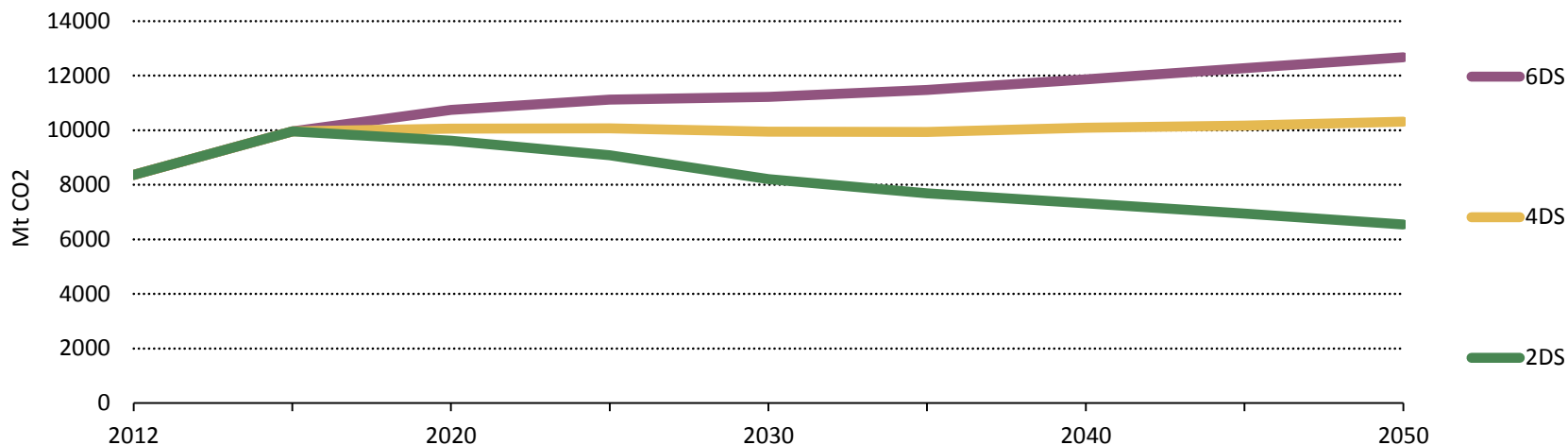
*Workshop on Renewables for Industrial sectors*

*Paris, 11 May 2015*

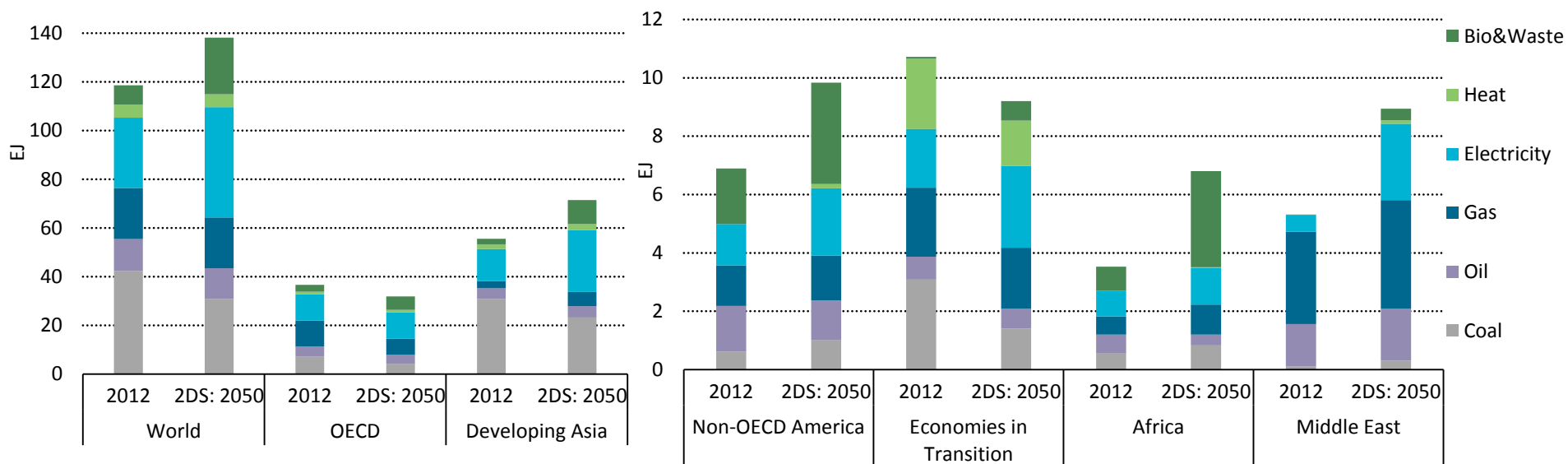
*Araceli Fernandez*

# Global industrial direct CO<sub>2</sub> emissions and final energy use

www.iea.org

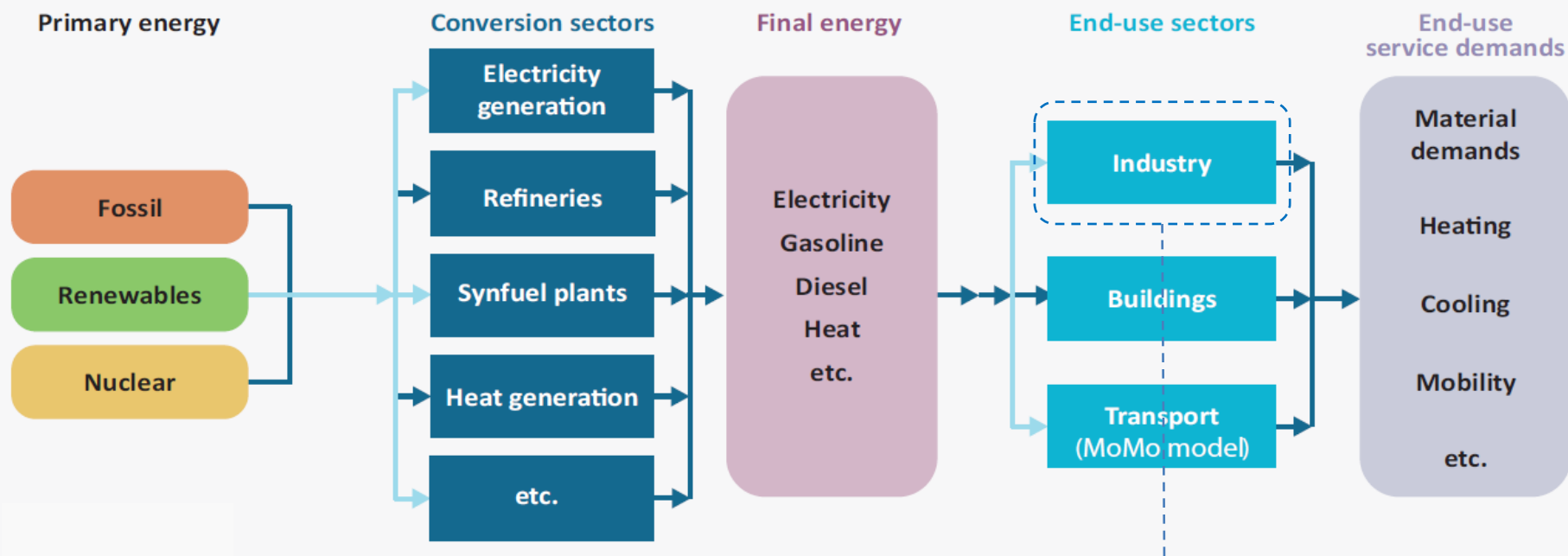


NOTE: Direct energy related and process CO<sub>2</sub> emissions from the industrial sector are included



NOTES: Industrial final energy excludes energy embedded in petrochemical feedstock. Bio & Waste also includes other renewable sources apart from biomass. © OECD/IEA 2015

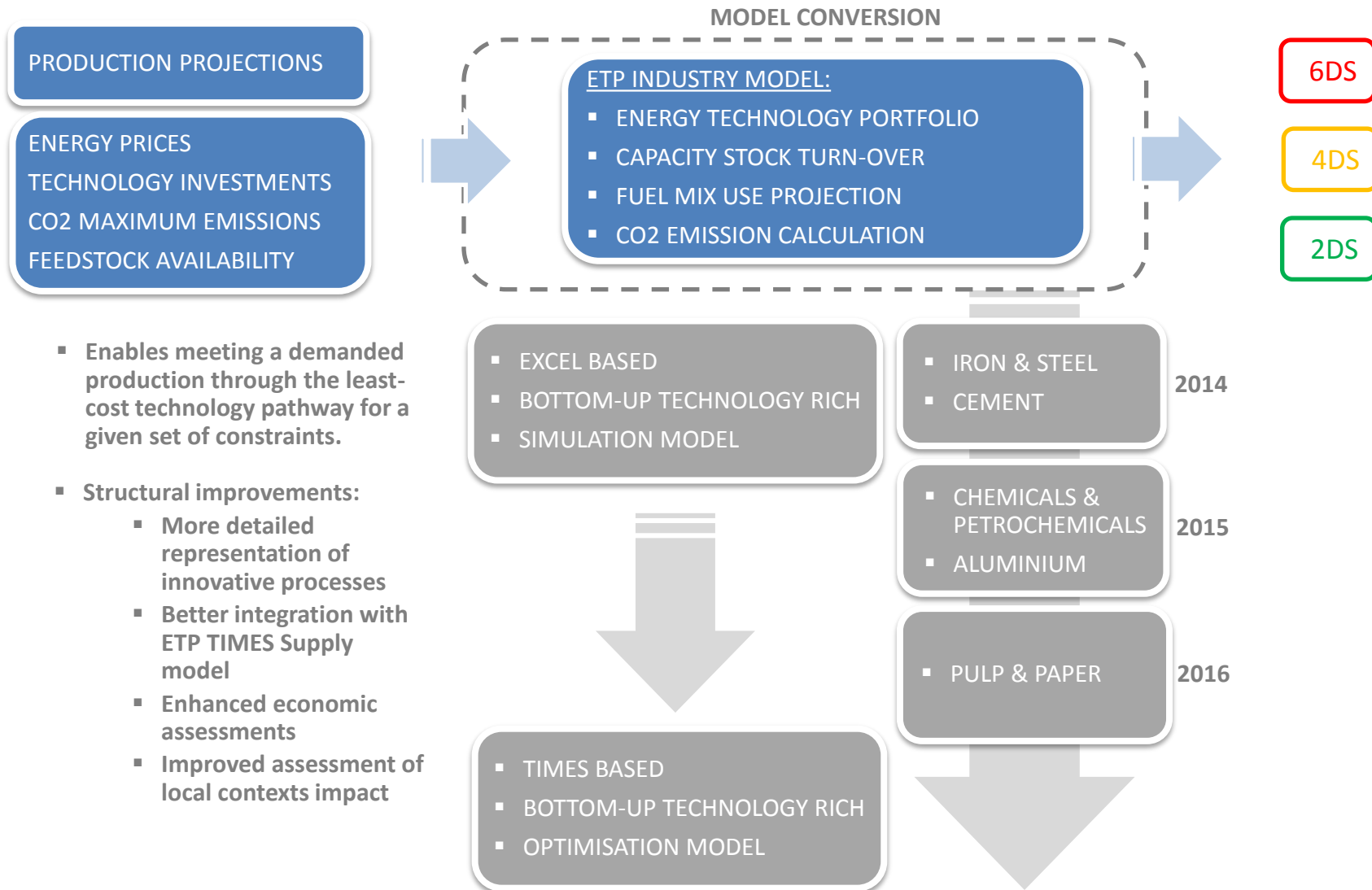
# ETP Energy System Model



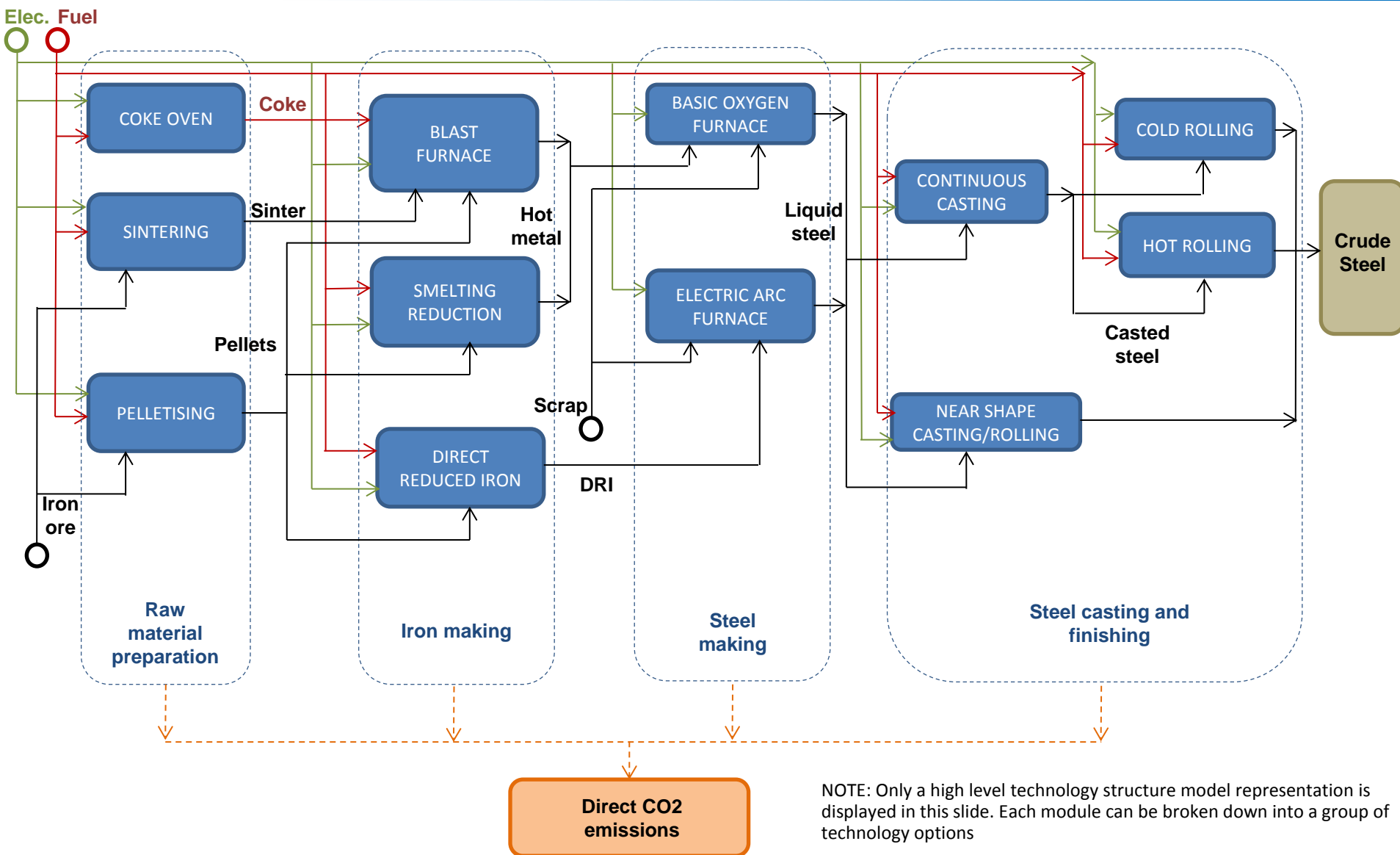
- Iron & Steel
- Cement
- Chemicals & Petrochemicals
- Pulp & Paper
- Aluminium

## ETP INDUSTRY MODEL:

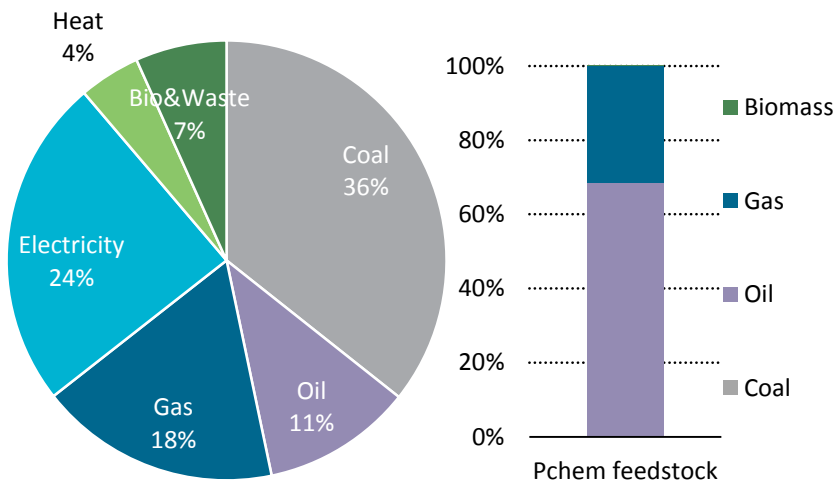
- Based on Excel
- Bottom-up simulation model
- Focus on long-term technology options
- 39 regions
- Time horizon up to 2050 (5yr time steps)



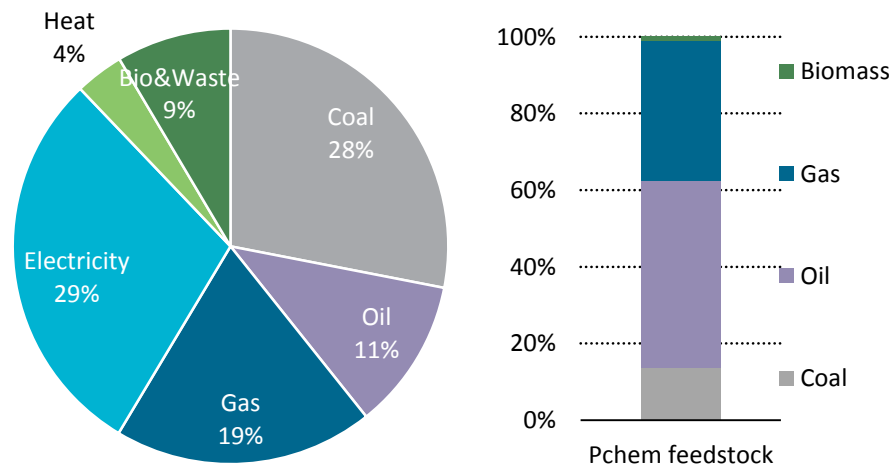
# ETP Times Iron & Steel model scope



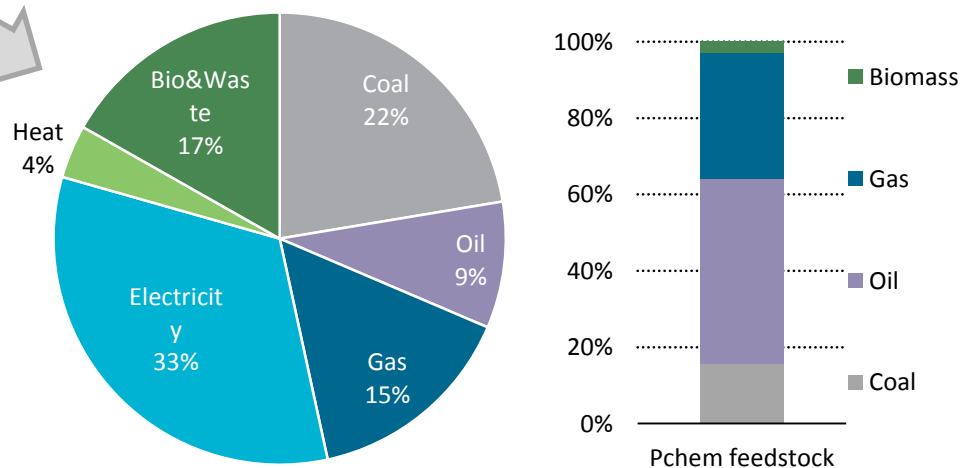
**2012**



**6DS: 2050**



**2DS: 2050**



**NOTES:** In this presentation,

- Industrial final energy excludes energy embedded in petrochemical feedstock.
- Bio & Waste also includes other renewable sources apart from biomass.

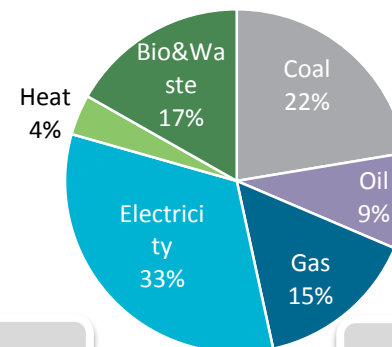
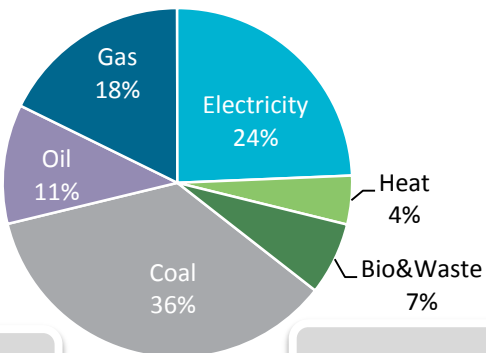


# Industrial final energy use mix

2012

2DS: 2050

WORLD

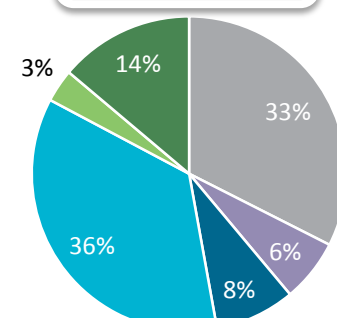
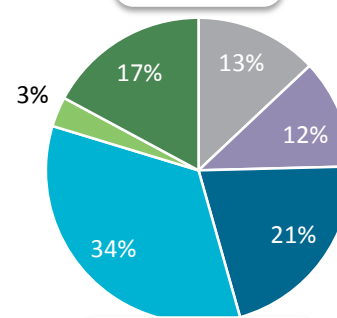
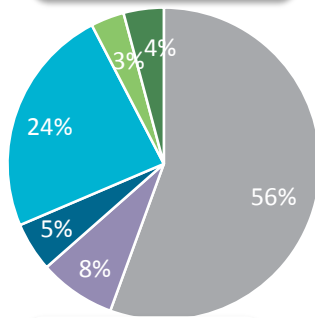
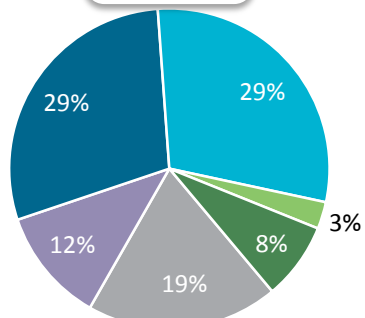


OECD

Developing Asia

OECD

Developing Asia

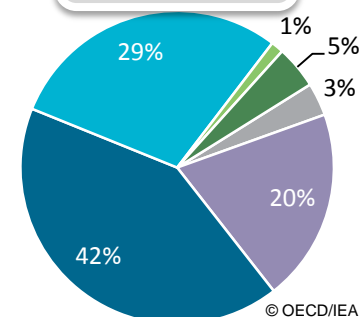
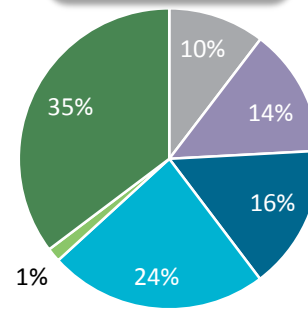
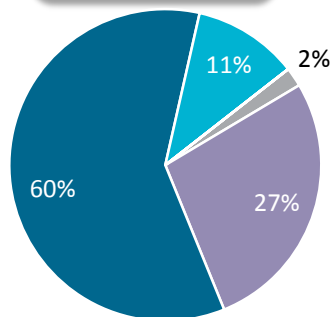
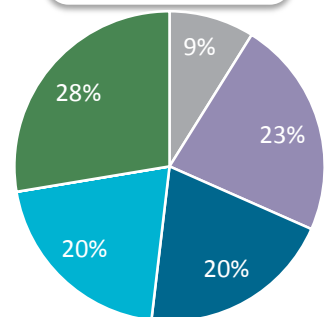


Non-OECD America

Middle East

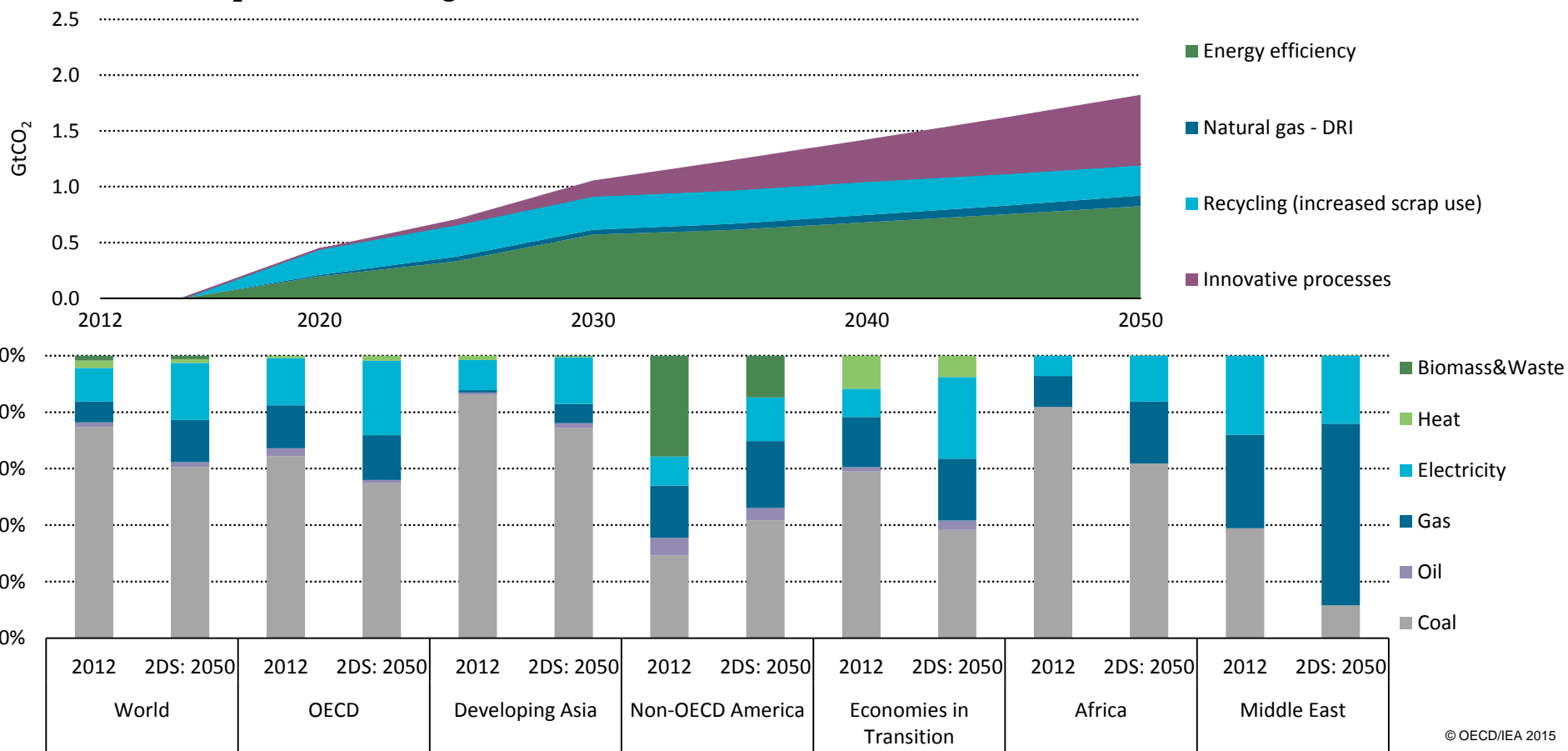
Non-OECD America

Middle East



- Charcoal based Blast Furnaces
- Electric Arc Furnaces based on renewable electricity
- Iron ore reduction supported with hydrogen from renewable sources
- Renewable based captive utilities

## Direct CO<sub>2</sub> emission savings 2DS vs 6DS

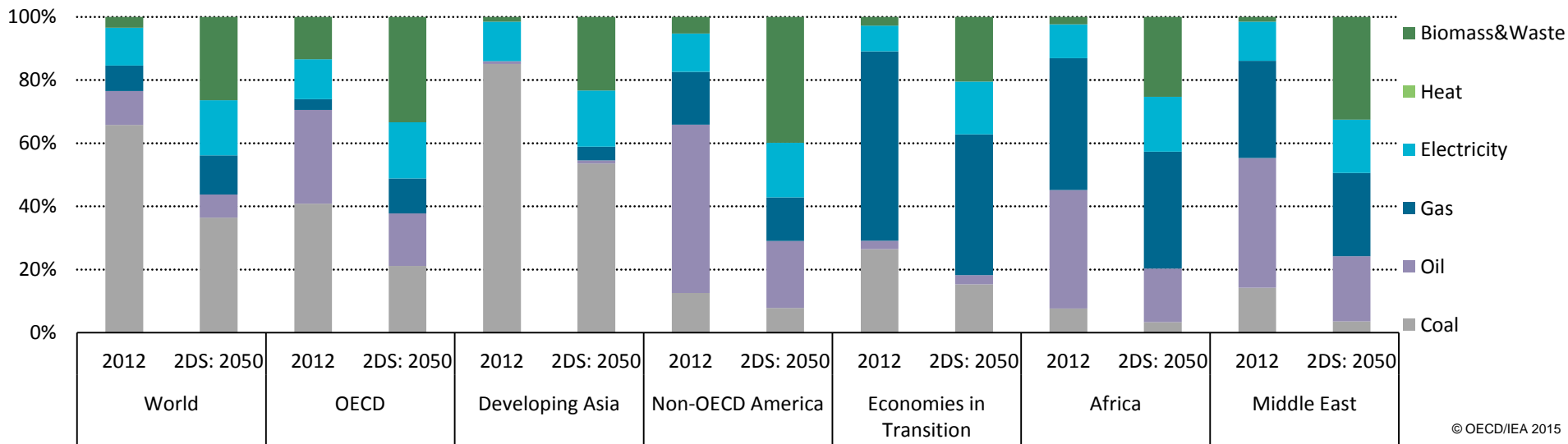
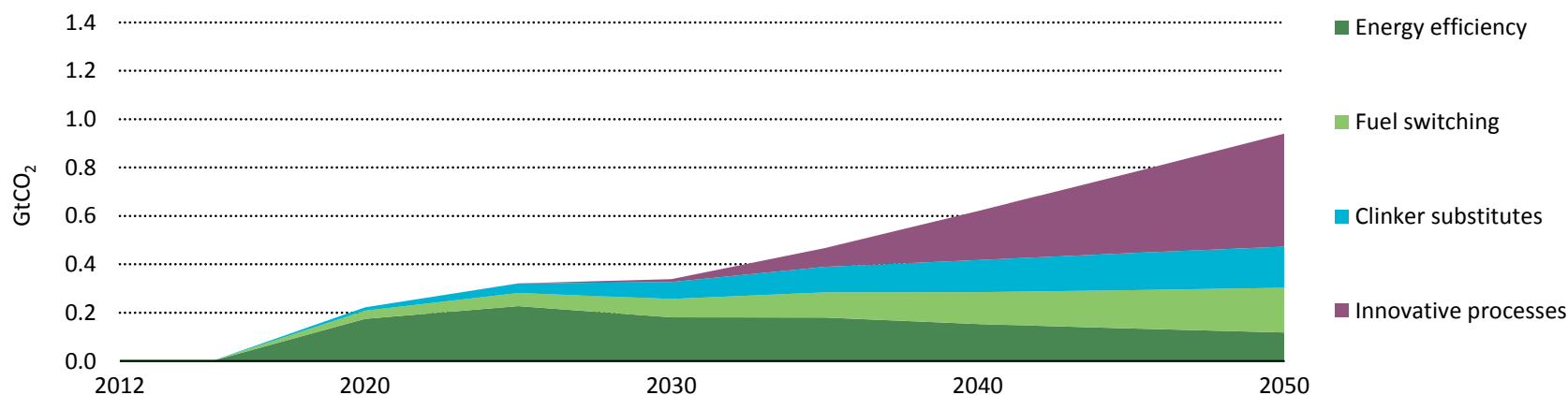




# Cement sector: Renewable main options

- Fuel switching
- Renewable based captive utilities

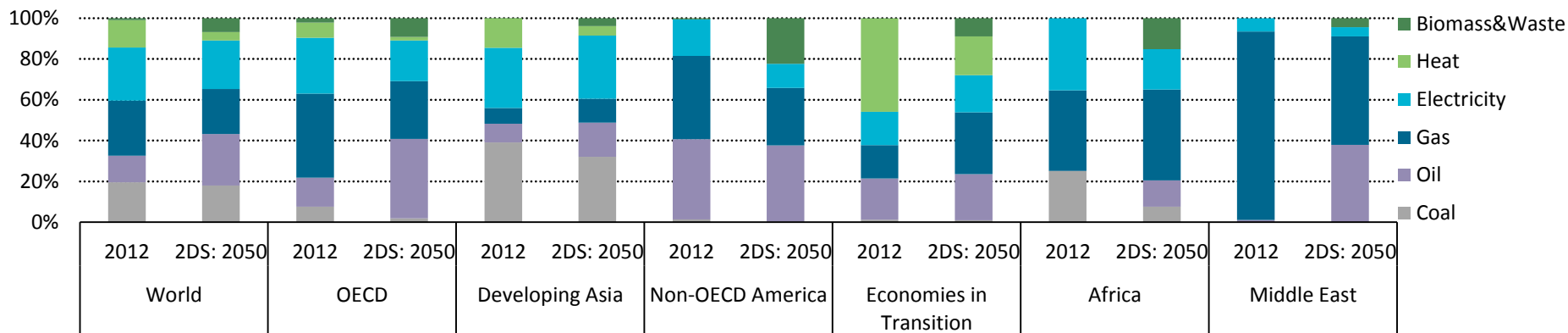
## Direct CO<sub>2</sub> emission savings 2DS vs 6DS



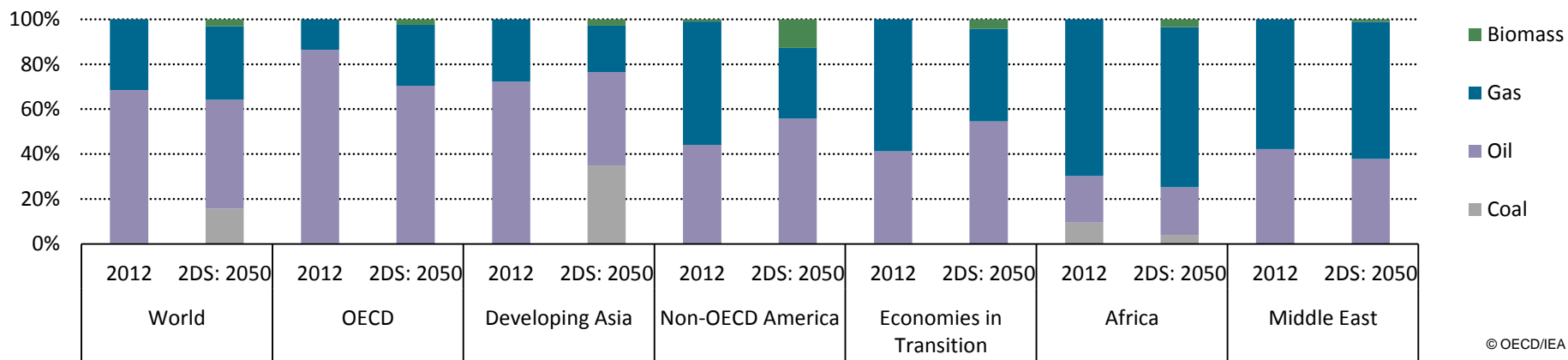
# Chemicals/Petrochemicals sector: Renewable main options

- Biomass based routes for olefins production (e.g. bioethanol route, MTO route)
- Biomass based routes for ammonia and methanol production
- Ammonia and methanol productions supported by renewable based hydrogen
- Renewable based captive utilities

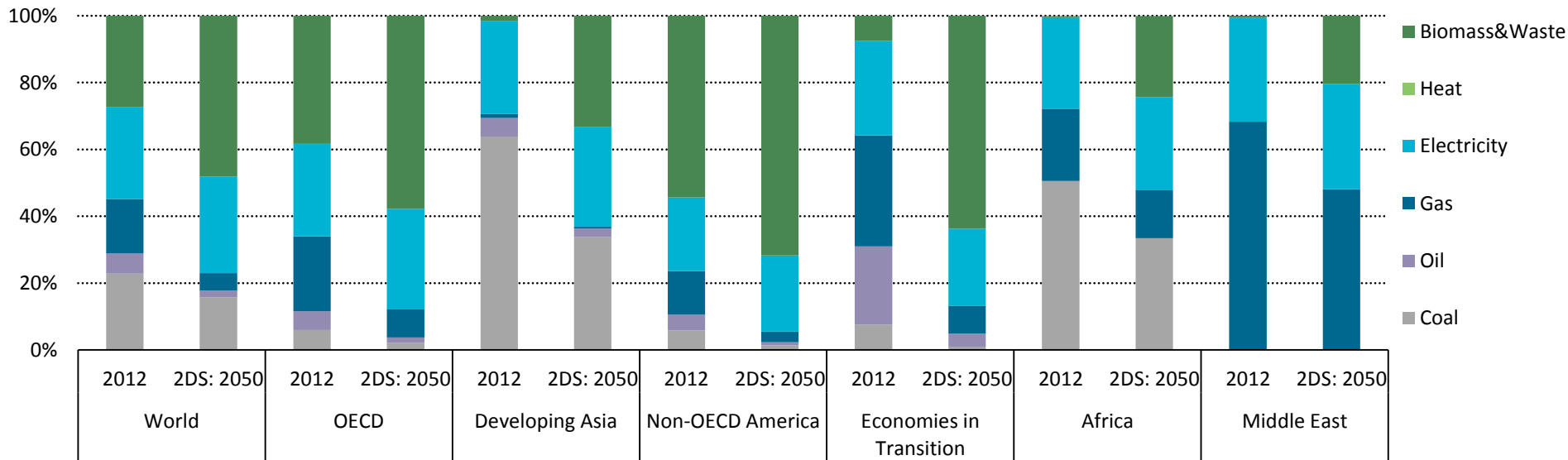
**Final energy use mix in Chemicals/Petrochemicals sector (excl. feedstocks)**



**Petrochemicals feedstocks mix**

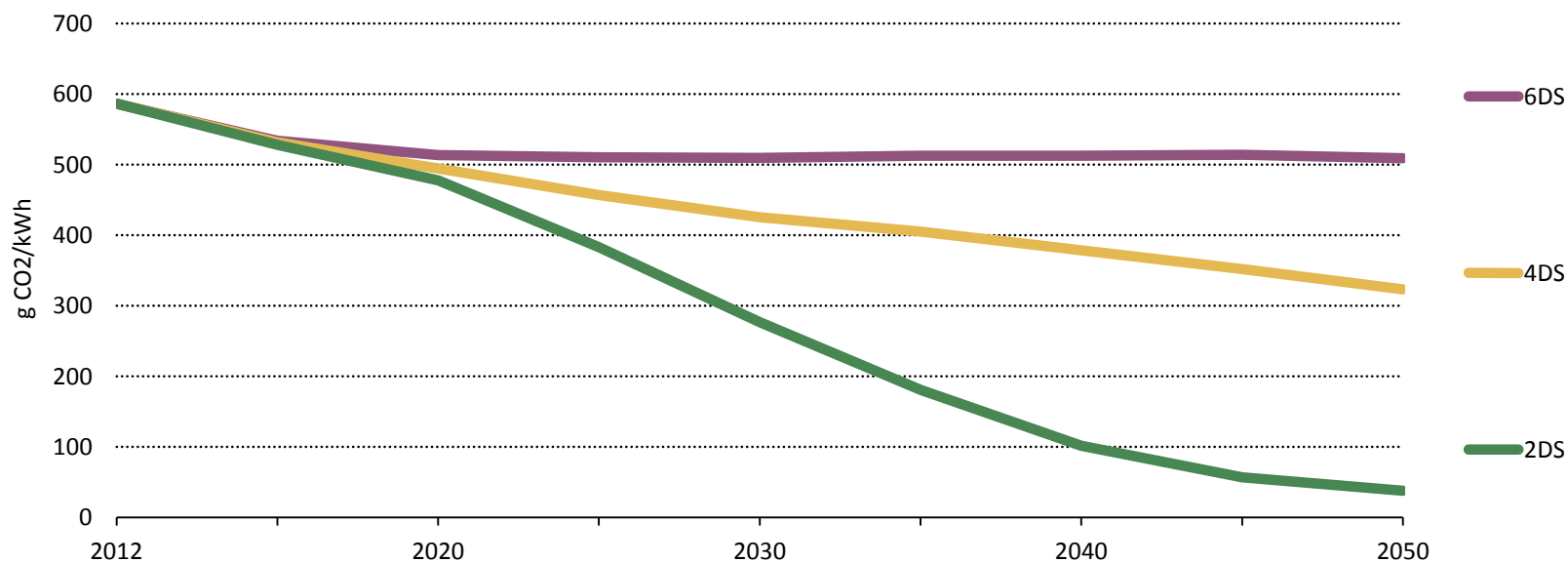


- Bio-refinery developments: biomass based routes for chemicals and fuels production
- Renewable based captive utilities



# Non-energy intensive industrial sector: Renewable main options

- Industrial operations based on renewable electricity
- Renewable based captive utilities (e.g. opportunities for solar thermal for lower temperature heat demand applications and possible upgrade through heat pumps)





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Energy Agency  
1974•2014

**Thanks!**

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