

ETP 2015: Iron & steel findings

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Tracking Clean Energy Progress 2015

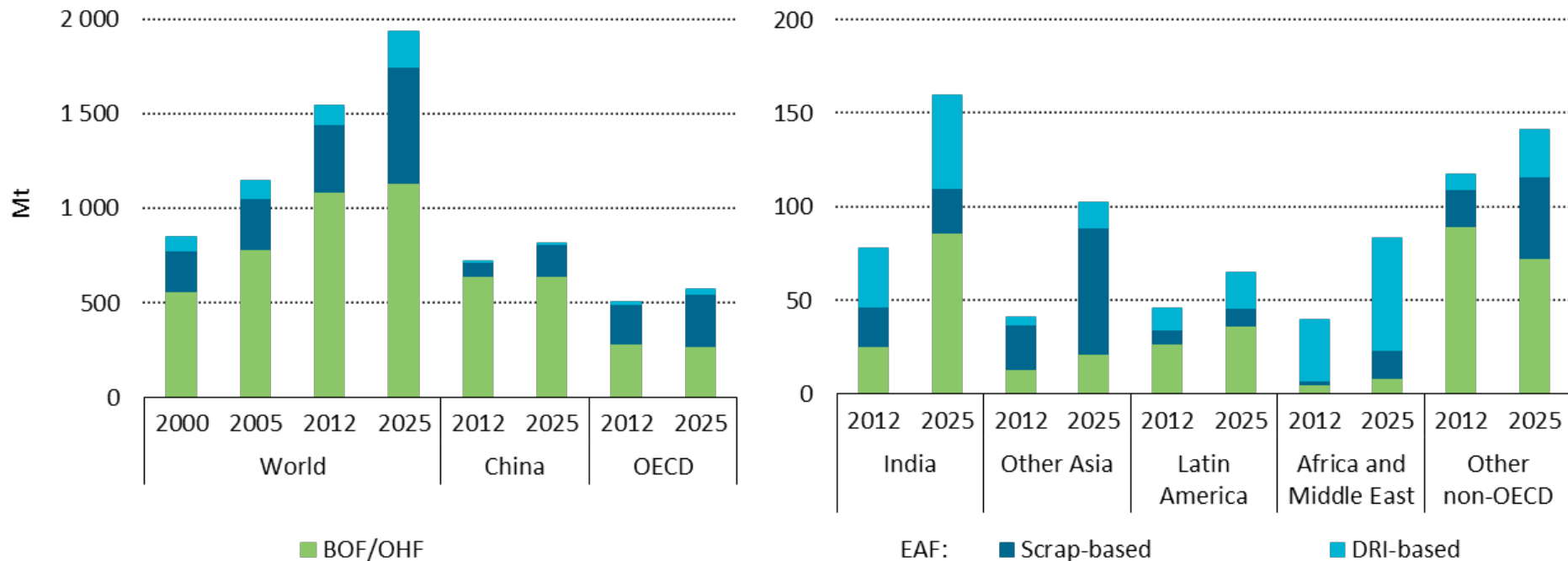
– trends in iron & steel

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- The iron and steel sector accounted for 22% of total industrial energy use and 31% of industrial direct CO₂ emissions in 2012
- Energy use grew by 2.2% in 2012, while crude steel production rose by 1.4%
- The 2DS requires growth in energy use of no more than 1.1% a year on average to 2025, even though crude steel production is expected to grow by almost 2% per year
- Widespread application of BATs is needed to help overcome the ongoing challenges of fluctuation in raw material availability and quality, carbon leakage and industrial competitiveness
- Private and public collaboration is needed to mitigate the impact of slow capacity stock turnover and high carbon abatement costs

Crude steel process routes by region

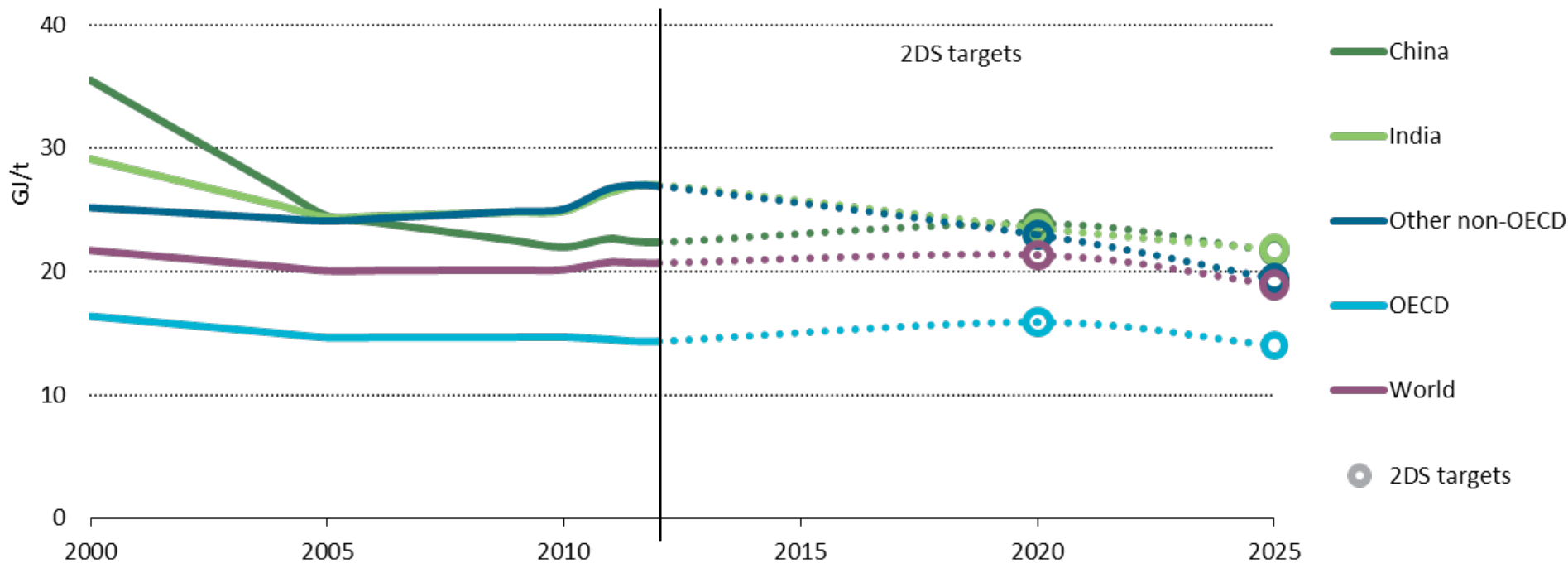
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- Global production is expected to continue to grow steadily, so energy efficiency will need to be improved to meet the 2DS emissions target
- The EAF route represents 42% of crude steel production in 2025 in the 2DS, compared with 30% in 2012, though deployment is limited by scrap availability

Energy intensity of crude steel production

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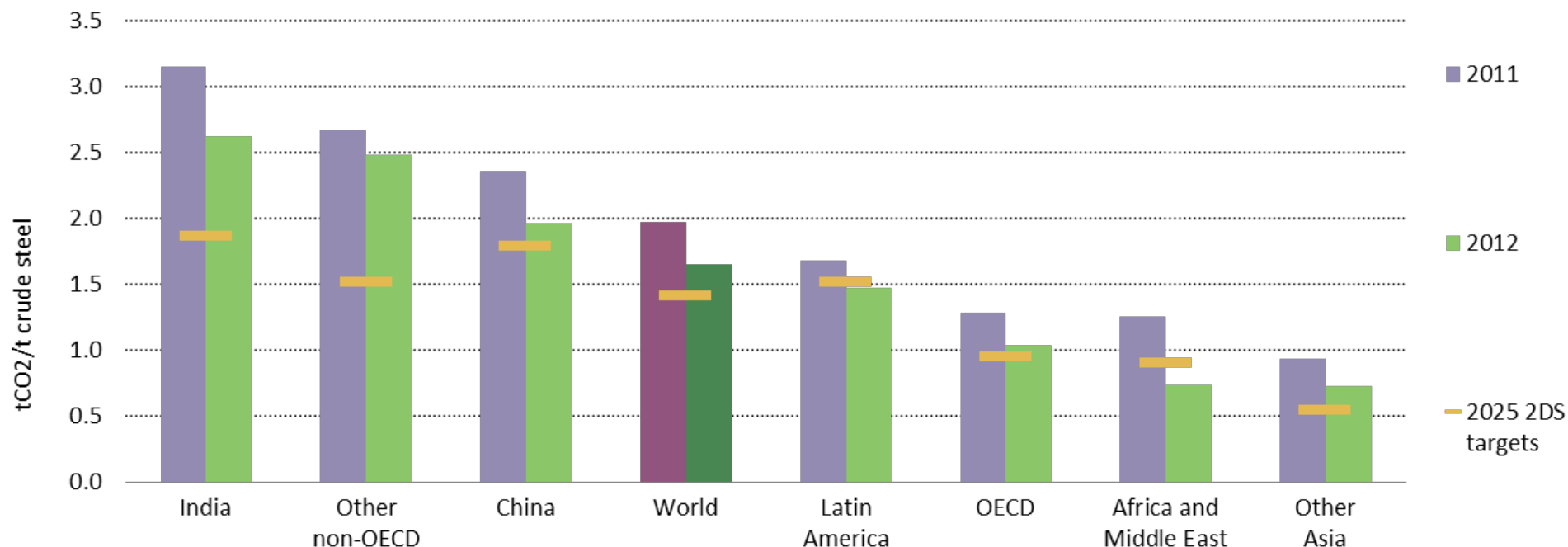


- Global aggregated energy intensity remained static at 20.7 GJ/t
- Energy intensity decreased by 1% to 14.3 GJ/t in OECD countries
- Improvement is needed to put the iron and steel industry on a trajectory to meet 2DS targets. Growth in energy demand must be limited to 28% below current trends, even though crude steel production is expected to grow by 25% from 2012 levels

Note: Aggregated energy intensity also includes fuel used in captive utilities which is related to thermal generation used onsite.

Direct CO₂ emissions intensity of crude steel production

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- Process routes shares (BOF vs EAF) is critical when assessing this indicator
- Direct CO₂ emissions intensity fell in all world regions from 2011 to 2012
- The world average decreased from 2.0 tCO₂/t crude steel to 1.7, while OECD countries improved from 1.3 tCO₂/t crude steel to 1.0
- Though progress has been made, development and deployment of innovative technologies to reduce CO₂ emissions from the iron and steel-making process is critical

Note: Aggregated CO₂ intensity also includes fuel used in captive utilities which is related to thermal generation used onsite.

Energy Technology Perspectives 2015

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- ETP 2015: Mobilising Innovation to Accelerate Climate Action
- Available for purchase and in OECD iLibrary

International Energy Agency > Publications > Energy Technology Perspectives

Energy Technology Perspectives

Energy Technology Perspectives 2015

As climate negotiators work towards a deal that would limit the increase in global temperatures, interest is growing in the essential role technology innovation can and must play in enabling the transition to a low-carbon energy system. Indeed, recent success stories clearly indicate that there is significant and untapped potential for accelerating innovation in clean technologies if proper policy frameworks are in place.

In an especially timely analysis, the 2015 edition of *Energy Technology Perspectives* (ETP 2015) examines innovation in the energy technology sector and seeks to increase confidence in the feasibility of achieving short- and long-term climate change mitigation targets through effective research, development, demonstration and deployment (RDD&D). ETP 2015 identifies regulatory strategies and co-operative frameworks to advance innovation in areas like variable renewables, carbon capture and storage, and energy-intensive industrial sectors. The report also shows how emerging economies, and China in particular, can foster a low-carbon transition through innovation in energy technologies and policy. Finally, ETP 2015 features the IEA annual Tracking Clean Energy Progress report, which this year shows that efforts to decarbonise the global energy sector are lagging further behind.

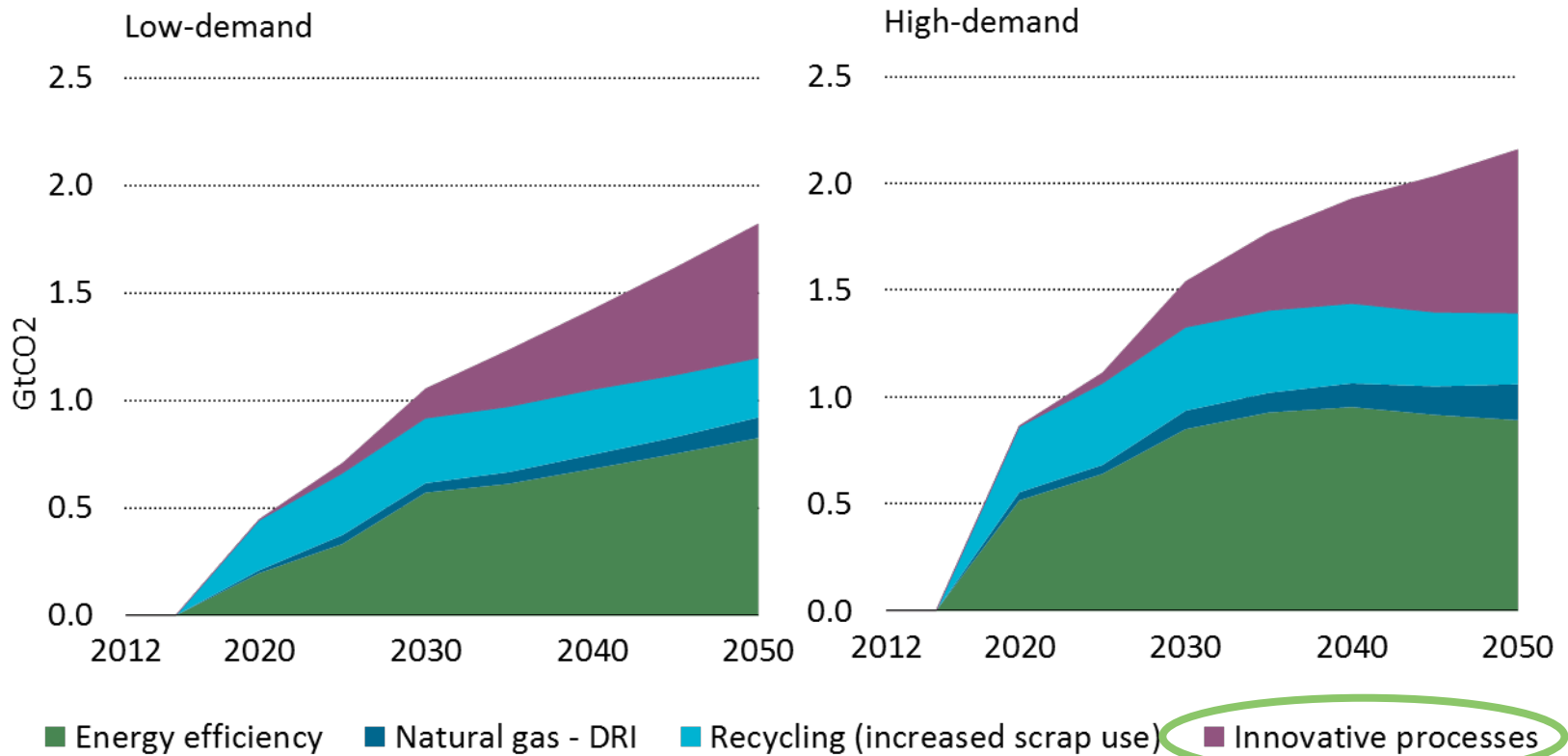
By setting out pathways to a sustainable energy future and by incorporating detailed and transparent quantitative modelling analysis and well-rounded commentary, ETP 2015 and its series of related publications are required reading for experts in the energy field, policy makers and heads of governments, as well as business leaders and investors.

ETP 2015 purchase includes extensive downloadable data, figures and visualisations. For more information, please visit www.iea.org/etp.

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- Progress on low-carbon industrial innovation over the next decade is crucial to achieve the 2DS with non-OECD countries being pivotal.
- Integrating CCS, improving resource efficiency, reusing industrial wastes and diversifying product applications should be cross-sectoral industry goals.
- Economic and policy uncertainty, and the need to manage risk and maintain competitive advantage, create substantial challenges to innovation progress.
- Existing measurement methods are inadequate to assess low-carbon industrial innovation performance.

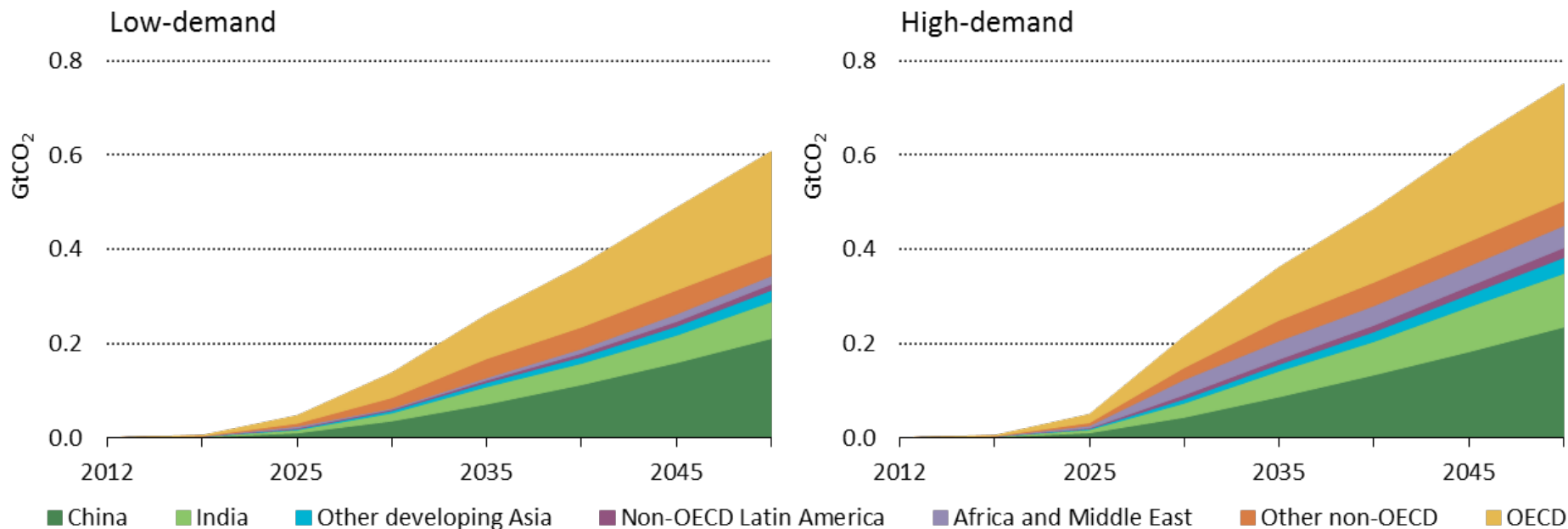
Iron & Steel direct CO₂ emissions reductions 6DS vs 2DS by technology



- Around 35% of required CO₂ emissions reductions in the iron and steel sector in 2DS in 2050 hinges on deployment of innovative processes



Iron & Steel direct CO₂ emissions reductions from innovative processes 6DS vs 2DS by region



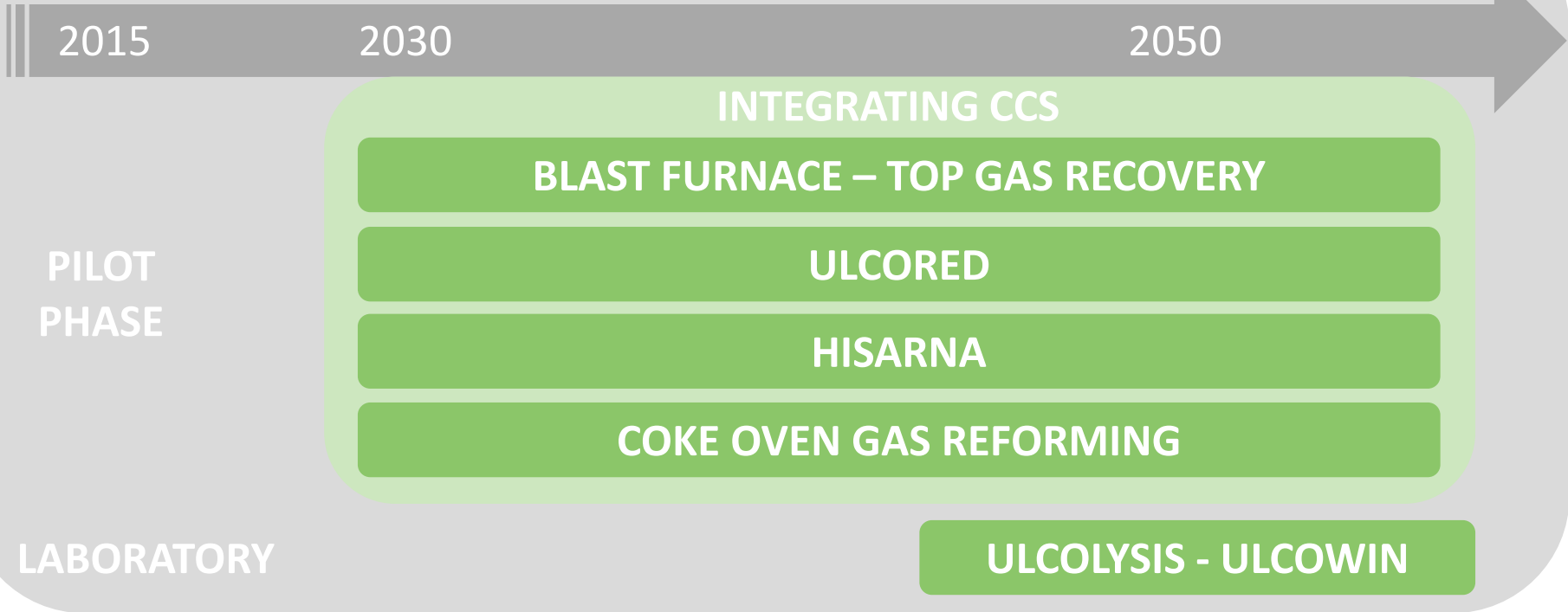
- About 36% of direct CO₂ emissions reductions from innovative processes come from China in 2050, and 35% from the OECD in the 2DS vs the 6DS



Iron & steel main innovative low-carbon options

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LOW-CARBON PROCESS INNOVATION



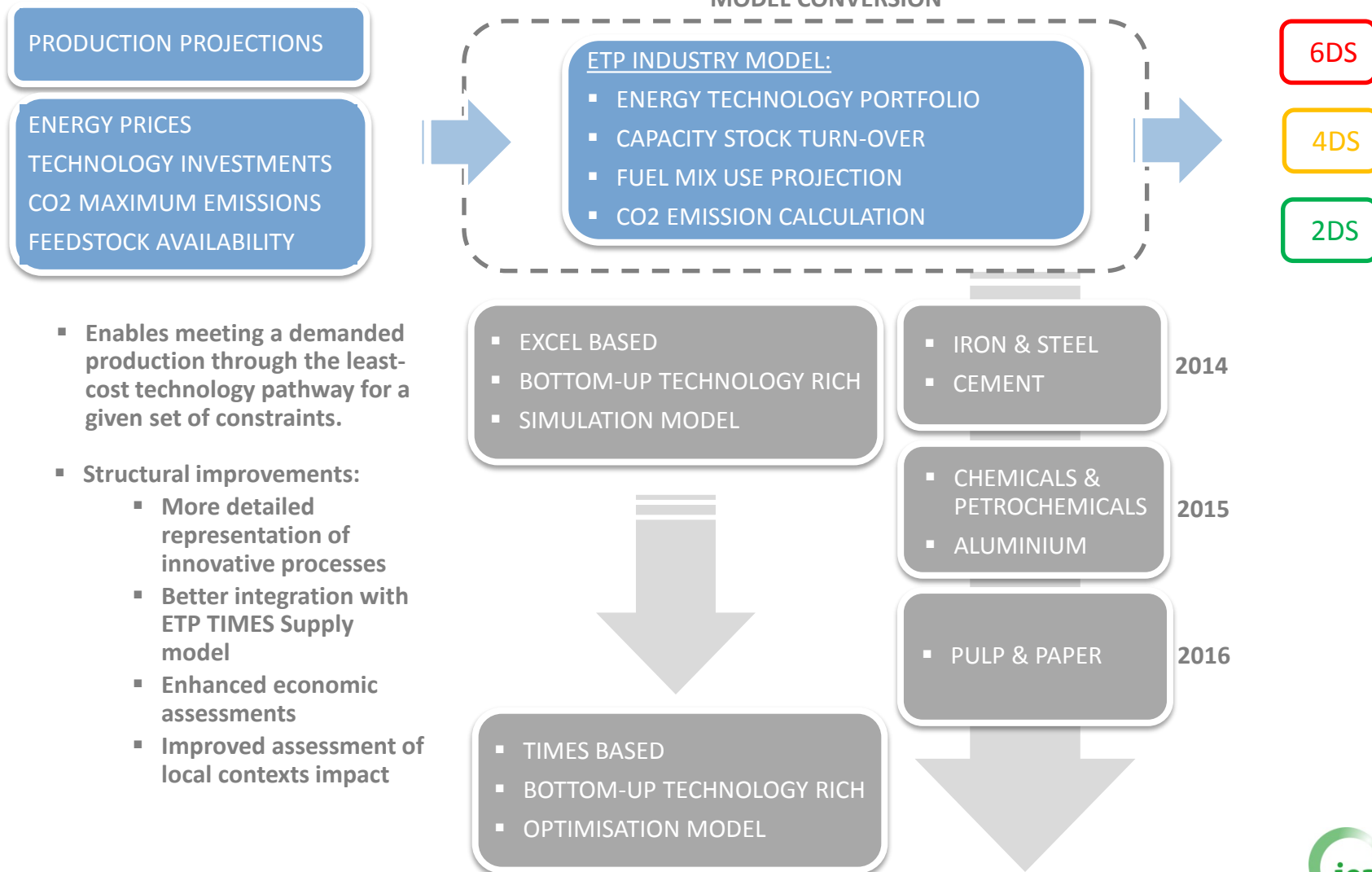
LOW-CARBON PRODUCT INNOVATION

HIGH PERFORMANCE STEEL

Note: This slide is not intended to provide an exhaustive list. Sketch is not at scale and time milestones are just illustrative.

ETP Industry model conversion

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- Enables meeting a demanded production through the least-cost technology pathway for a given set of constraints.
- Structural improvements:
 - More detailed representation of innovative processes
 - Better integration with ETP TIMES Supply model
 - Enhanced economic assessments
 - Improved assessment of local contexts impact

ETP TIMES Iron & Steel model scope

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