

Science, Technology and Innovations for a Cool Earth: Toward Net-Zero Emissions

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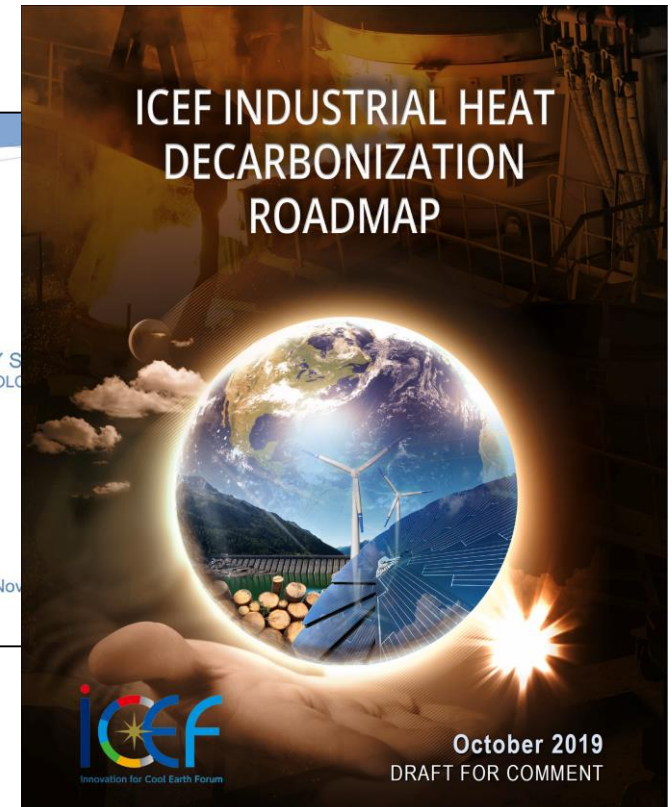
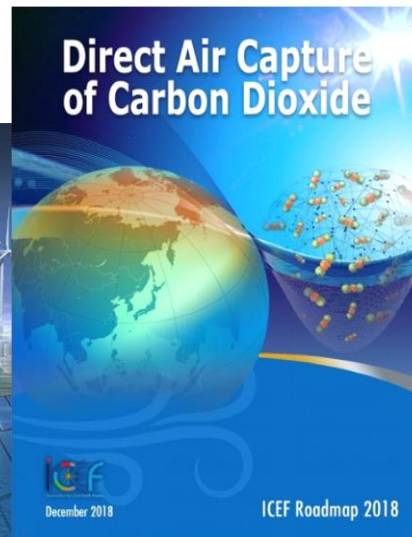
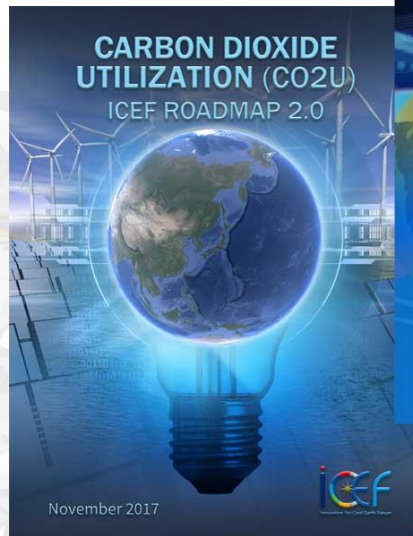
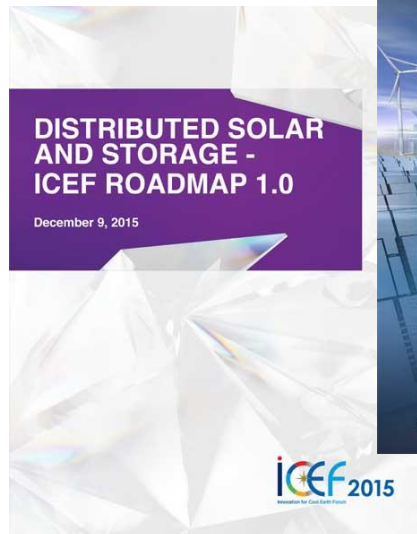
Vienna University of Technology (TU WIEN)



COP25 Side Event: Leap ahead to Decarbonization: The launching event of the latest ICEF Roadmap on “Industrial Heat Decarbonization” – 11 December 2019

ICEF Roadmap Projects

- ICEF publishes innovation roadmaps for CARBON DIOXIDE UTILIZATION and ENERGY STORAGE and other technologies with the potential to contribute significantly to long-term Net Zero Emissions. The penultimate roadmap on on DIRECT AIR CAPTURE OF CARBON DIOXIDE was presented at COP24.
- The latest ICEF roadmap on INDUSTRIAL HEAT DECARBONIZATION is presented now at COP25.



Transformational Change

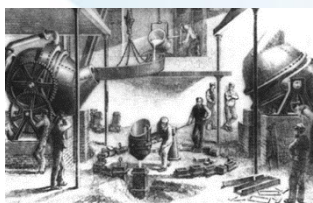
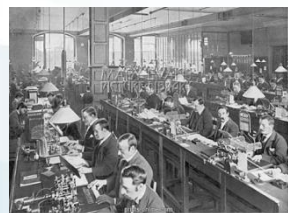
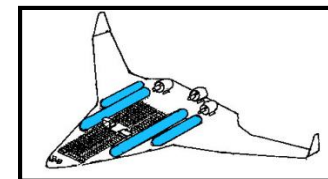
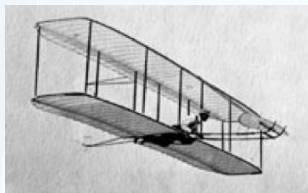
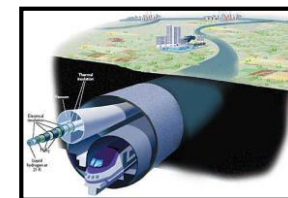
1850

1900

1950

2000

2050

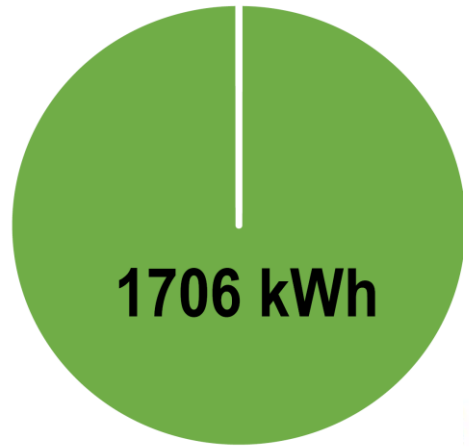


Industry: Scale of Activity

World Industry	1990	2017	<i>Increase</i>
People employed (million)	510	709	1.4
Value added (trillion US\$)	7	20	2.9
7 Major commodities (Gt)	2.5	6.6	2.6
Final energy use (EJ)	96	150	1.6
CO ₂ emissions (MtCO ₂)*	7645	13451	1.8

*Industry direct including steel and cement plus pro-rated electricity emissions.

Impact of IC Technology Convergence



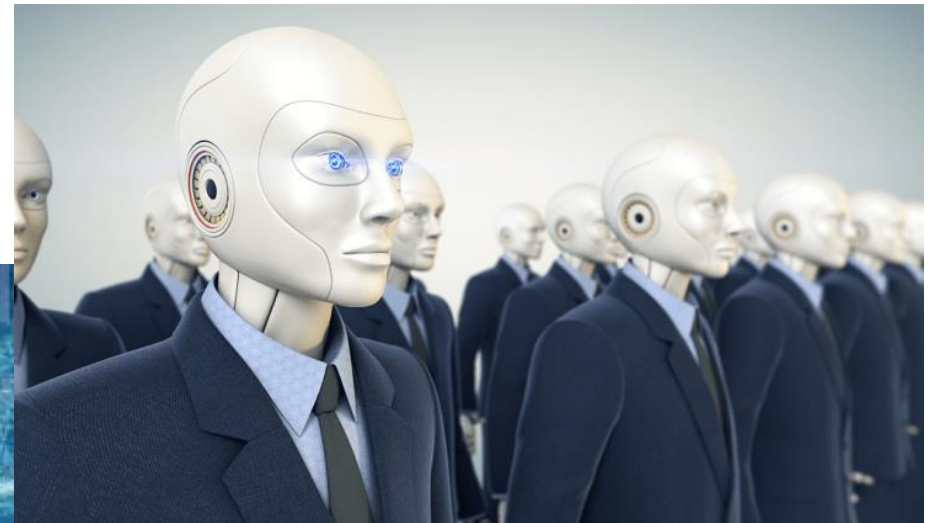
Embodied energy



Weight

Digital Revolution – Convergence

Artificial Intelligence, Deep Learning, Big Data, Robotics, Nanotechnology, Quantum Computing, Synthetic Biology, The Internet of Things, 3D Printing, Block Chain, Autonomous Vehicles, Augmented Reality





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THANK YOU



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