

# Toward Long Term ,Deep Emission Reductions -Needs of developing sectoral ZE technologies-

Yoichi Kaya  
Research Inst. of Innovative Tech.  
for Earth(RITE)  
February 9, 2018

# The target in Paris agreement and CO2 Zero emission

## 1. Temp. target

Stabilization of the global temperature ( 2 deg. , hopefully 1.5 deg.)

## 2. Action target

Achieve net zero emission(ZE) of GHG's

→

Most important among GHG's: CO2

#much longer life time in the air

#larger radiative forcing than other GHG's

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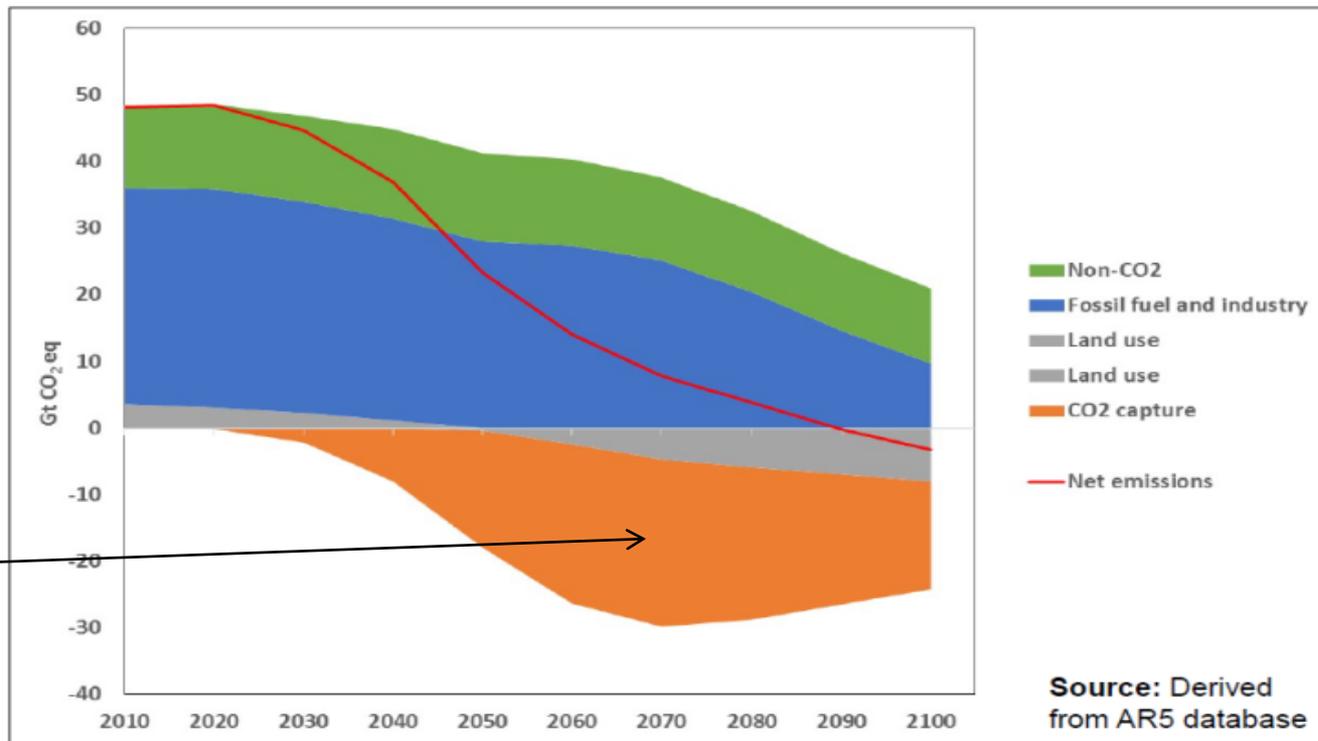
achievement of net zero CO2 emission

= the most important condition of stabilizing the global temp.

# BECCS in IPCC IAM's 2 deg. scenarios

—IPCC WG3 chair J.Skea ed.—

**Balancing sinks and sources and long-term low greenhouse gas emission development strategies (Article 4)**



Negative Emission Max 30GtonCO2

Note: One illustrative scenario with a 65% probability of getting below 2°C warming

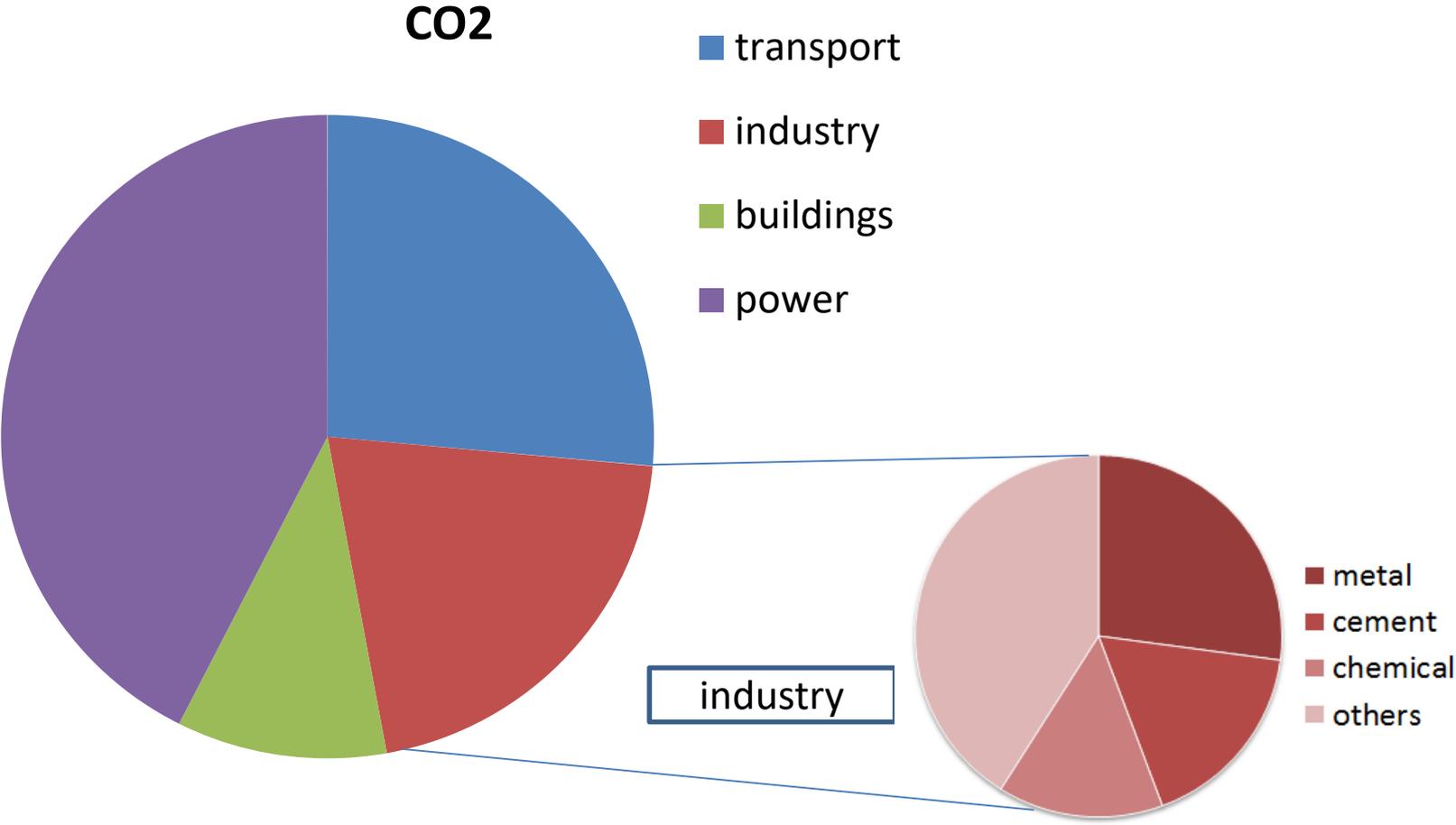
# BECCS in IPCC scenario

## - its physical realizability -

Net CO<sub>2</sub> emission = Emission – Absorption

- Anthropogenic absorption: BECCS, Afforestation
- Difficulties in implementing large scale absorption: BECCS case
- Ex. Absorption of 15 Gton CO<sub>2</sub> requires
- 1) (0.4~1.0) whole USA area for biomass production\*
- 2) 30,000 storages of 1Mton /year
- \* rain tropical forest~savanna
- source:Woodwell, G.M.et al,Science vol.199, Jan 1978

# Global CO2 emission from energy (2014)



Source: IEA World Energy Outlook 2016

# Needs of developing sectoral zero emission technologies

sector	zero emission technologies	Issues to be overcome
Power generation	nuclear renewables hydro, geothermal solar, wind biomass	<ol style="list-style-type: none"> <li>1. Adjustment of demand supply gap- battery cost</li> <li>2. Frequency control due to lack of inertia</li> </ol>
Transport	electricity  biofuels	<p>Needs of large capacity of batteries</p> <p>Large scale production of cellulose based biofuels</p> <p>realization of low cost</p> <p>Control of biofuel quality</p>
Iron and steel	blast furnaces with CCS electrolysis direct reduction by hydrogen	<p>High costs</p> <p>Large scale use of non carbon power</p>