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#### What's Required? Regional Emissions Effort.





## **Global Emissions & Temperature**

Shading reflects some of the uncertainty in the climate response to emissions (shown for only a few scenarios)





#### **Emissions Trading Partnerships – Possible International Cooperation**





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#### **There Are Partnership Opportunities, e.g...**





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## **Opportunities Shaped by Ambition & Available Technology**

2.5

2.0

1.5

1.0

0.0

per year

CO2e 0.5 US 🛛

EU





Annual Permit Trade Volume

CCS

preliminary

#### Larger Partnerships – More Value, But Whose Value?





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#### **Strategic Perspectives – Alternative Trading Partners**



NPV gains in regional consumption (all countries pursuing higher ambition policies)

EPEI ELECTRIC POWER RESEARCH INSTITUTE

8

### **Country Risks Could Affect Partner Appeal**

#### Country risk factors





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2

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#### **Emissions Trading a Means for Increasing Ambition?**



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May be possible in particular circumstances – e.g., US increases ambition and starts trading partnership with India

### **Emissions Trading a Means for Increasing Ambition?**

May be possible in particular circumstances – e.g., US increases ambition and starts trading partnership with India

- → India reduces more to sell credits, lower total emissions, lower US costs, India revenues
- → Repeatable with US-India? Likely limited



#### **There May be Limits to Domestic Abatement**



Additional ambition may require international cooperation

As caps become very tight...

- (a) Countries willing to pay to relax emissions caps (e.g., at \$1000/tCO<sub>2</sub>e), and
- (b) With trading partnerships may not need to do so

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#### **Concluding Remarks**

- The international climate goal implies enormous effort for all countries
  - Paris pledges just a beginning, but even they are non-trivial
- International emissions trading partnership opportunities exist
  - Ambition (individual & relative) and technology will define relationships
    - Opportunities with higher or lower ambition, but ambition disincentives
    - Technology R&D incentives
  - Larger partnerships increase total benefits, but can affect distribution
  - Not all partnerships equal strategic incentives
  - Trading a means for lowering costs, but also potentially for increasing ambition
- This analysis assuming known inventories and trading between countries with domestic energy system caps. Other forms of cooperation?
- International cooperation may be vital to the ambitions of COP21





# Thank you!

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#### **Together...Shaping the Future of Electricity**



#### India & Other Countries

Level 2:

**Mid-century** 

3b

6

peak and decline stronger decline

Level 3:

Earlier peak and

7

Level 1:

Post-2050

leveling off

2a

3a

5

BAU

1

2

3

4

Scenarios

# EU, US, Other G20, China

BAU

NDC only

NDC +

NDC ++

EU, US,	Other
G20, C	China

	US	EU	OG20	China	Post-2050 reductions
NDC only	NDC	NDC	NDCs	NDC	0%/yr
	NDC, 2050	NDC, 2050	NDCs, 2050	NDC, 2050 =	
NDC +	50% (2005)	50% (1990)	20% (1990)	2030	1.5%/yr
				NDC, 2050	
	NDC, 2050	NDC, 2050	NDCs, 2050	60% < 2050	
NDC ++	80% (2005)	80% (1990)	50% (1990)	BAU	4.5%/yr

	India peak year	OC peak year	Post-peak reductions
evel 1: Post-2050 leveling off	2060	2060	0%/yr
evel 2: Mid-century peak and decline	2050	2050	1.5%/yr
evel 3: Earlier peak and stronger decline	2040	2040	4.5%/yr





#### **Potential Future Regional Emissions Constraints**





## **Potential Global Emissions & Temperature**

Shading reflects some of the uncertainty in the climate response to emissions (shown for only a few scenarios)



#### preliminary

