Global Electric Power Sector: Engaging with Environmental Issues

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KEYNOTE SPEECH

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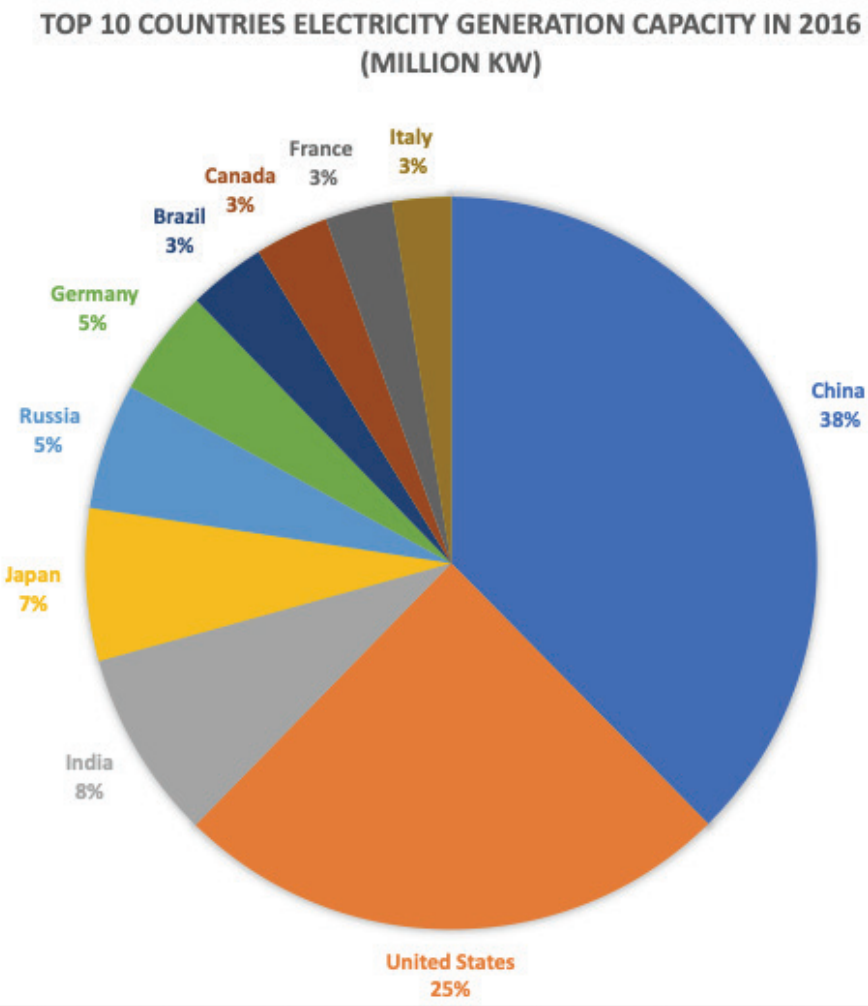

Country	Million KW
China	1653
United States	1087
India	368
Japan	296
Russia	245
Germany	209
Brazil	151
Canada	144
France	131
Italy	114

Source: Energy information Administration (EIA)

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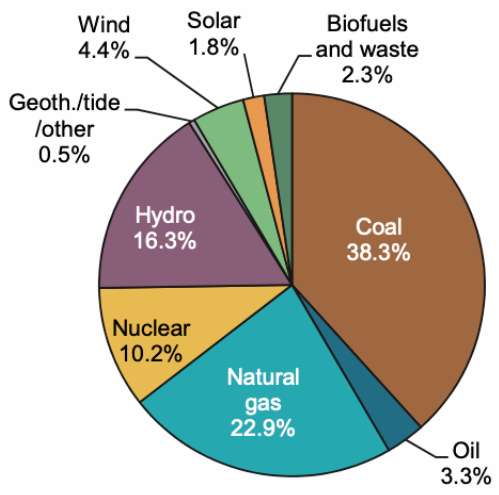
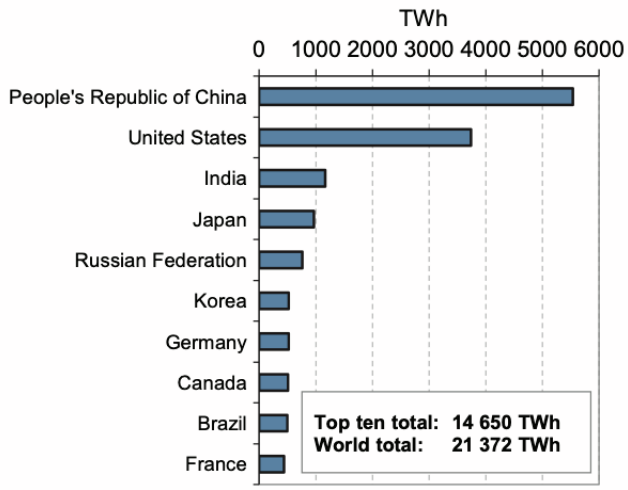
World Gross Electricity Production in 2017 by Source 25,721 TWh



Source: IEA Electricity Information Overview 2019

Top 10 Electricity Consuming Countries in 2017 TWh



Source: IEA Electricity Information Overview 2019

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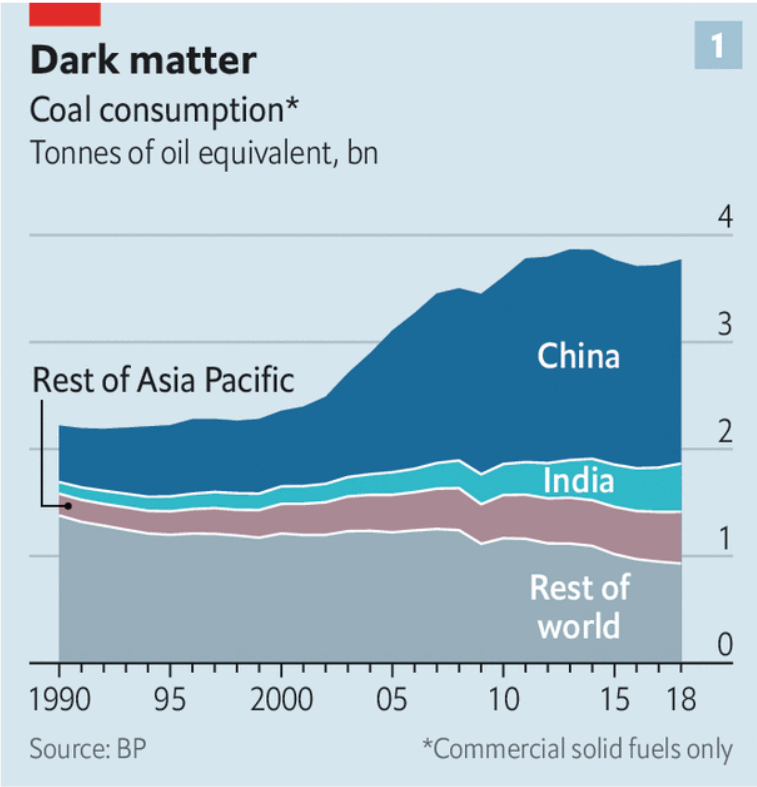
Over 75% of Global Demand for Coal Comes from Asia



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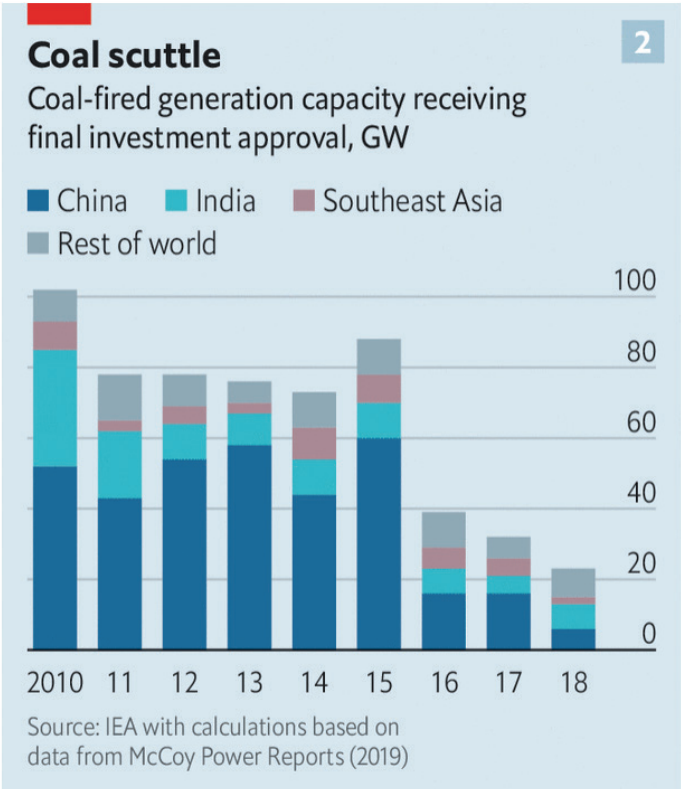

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Top 20 Countries that emitted the most CO2 in 2016

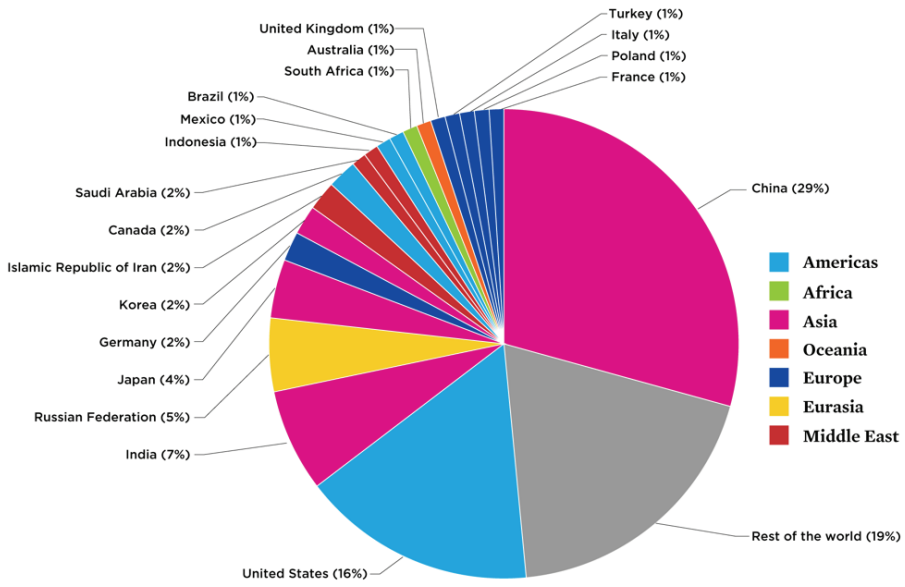
Rank	Country	CO_2 emissions (total)
1	China	9056.8MT
2	United States	4833.1MT
3	India	2076.8MT
4	Russian Federation	1438.6MT
5	Japan	1147.1MT
6	Germany	731.6MT
7	South Korea	589.2MT
8	Islamic Republic of Iran	563.4MT
9	Canada	540.8MT
10	Saudi Arabia	527.2MT
11	Indonesia	454.9MT
12	Mexico	445.5MT
13	Brazil	416.7MT
14	South Africa	414.4MT
15	Australia	392.4MT
16	United Kingdom	371.1MT
17	Turkey	338.8MT
18	Italy	325.7MT
19	Poland	293.1MT
20	France	292.9MT

REPORTS & MULTIMEDIA / EXPLAINER

Each Country's Share of CO2 Emissions

Published Jul 16, 2008 | Updated Oct 10, 2019

More:
En español



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Source: Union of Concerened Scientists https://www.ucsusa.org/resources/each-countrys-share-co2-emissions

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Ranking by per capita CO2 emissions 2016

Rank	Country	CO_2 emissions (per capita)
1	Saudi Arabia	16.3T
2	Australia	16.2T
3	United States	15.0T
4	Canada	14.9T
5	South Korea	11.6T
6	Russian Federation	9.9T
7	Japan	9.0T
8	Germany	8.9T
9	Poland	7.7T
10	South Africa	7.4T
11	Islamic Republic of Iran	7.1T
12	China	6.4T
13	United Kingdom	5.6T
14	Italy	5.4T
15	France	4.5T
16	Turkey	4.2T
17	Mexico	3.6T
18	Brazil	2.0T
19	Indonesia	1.7T
20	India	1.6T

Source: Union of Concerened Scientists https://www.ucsusa.org/resources/each-countrys-share-co2-emissions

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Changes in Generation Mix in China

Year	Hydro/Solar/Wind (%)	Thermal (%)
2001	25.56	73.47
2016	33.80	63.77
2018	37.00	60.00
2030	52.00	42.00

China will start to reduce its CO2 emissions beginning in 2030

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Six Greenhouse Gases

Carbon dioxide (CO_2)

Methane (CH_4)

Nitrous oxide (N_2O)

Hydro fluorocarbons (HFCs)

Per fluorocarbons (PFCs)

Sulphur hexafluoride (SF_6)

1997 CO2 emissions from fossil fuels and cement production: 30.4 billion tons

2018 CO2 emissions from fossil fuels and cement production: 41.1 billion tons

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Global Warming Potential (GWP) of Greenhouse Gases

Carbon dioxide (CO_2):	1
Methane (CH_4):	28
Nitrous oxide (N_2O):	265
Hydro fluorocarbons (HFCs):	138
Per fluorocarbons (PFCs):	6,630
Sulphur hexafluoride (SF_6):	23,500

(over 100-year time scale)

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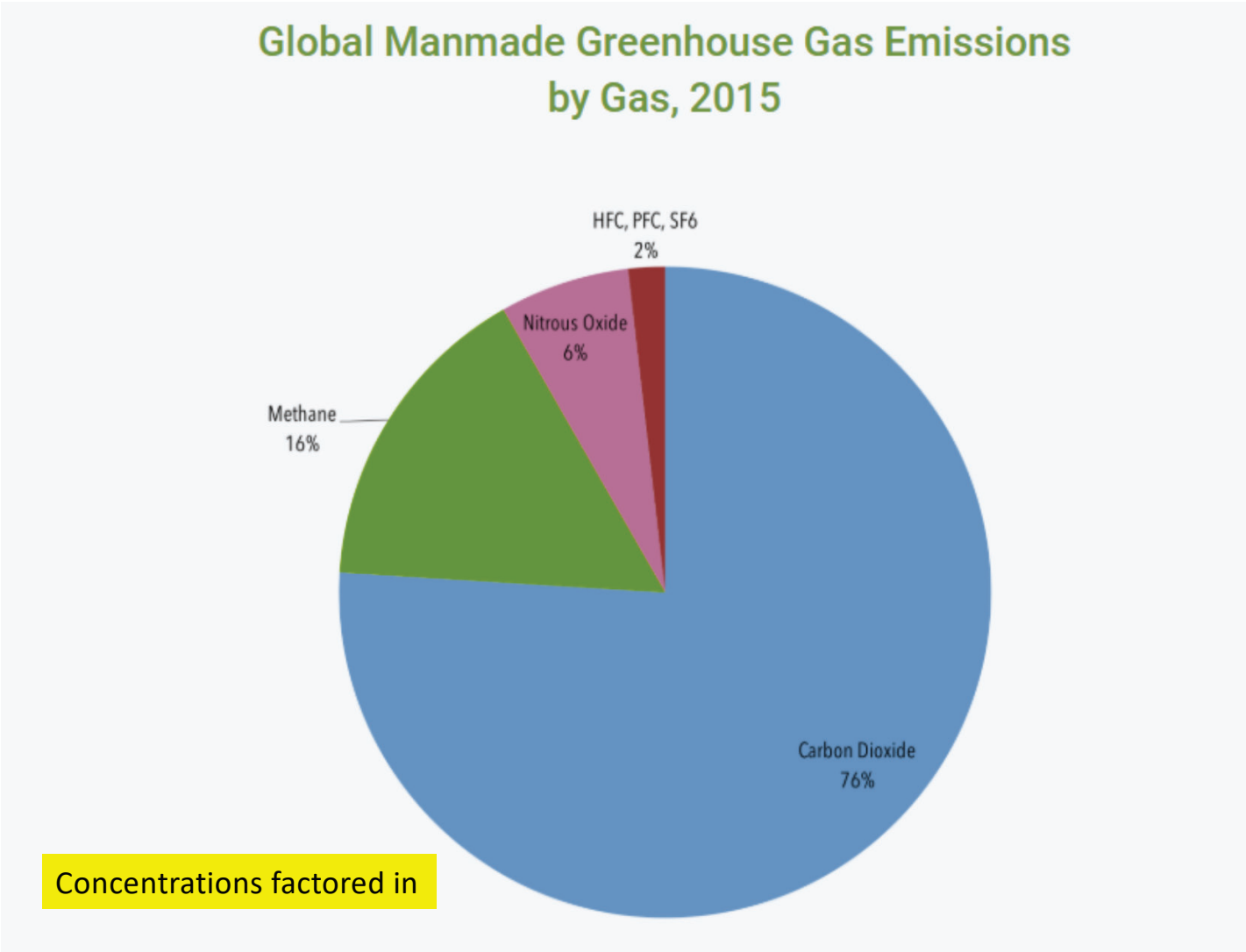

Concentrations factored in

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Sources of atmospheric methane

(1) Natural wetlands;

(2) Paddy rice fields;

(3) Emission from livestock production systems;

(4) Biomass burning (including forest fires);

(5) Anaerobic decomposition of organic waste in landfills;

(6) Fossil methane emission during the exploration and transport of fossil fuels.

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Relative Emissions from Electricity Production Sources in the US (grams/kWhr)

Plant Type	NOx	SO_2	CO_2
Gas	2.32	0.004	490
Oil	2.02	5.08	781
Coal	3.54	9.26	1090

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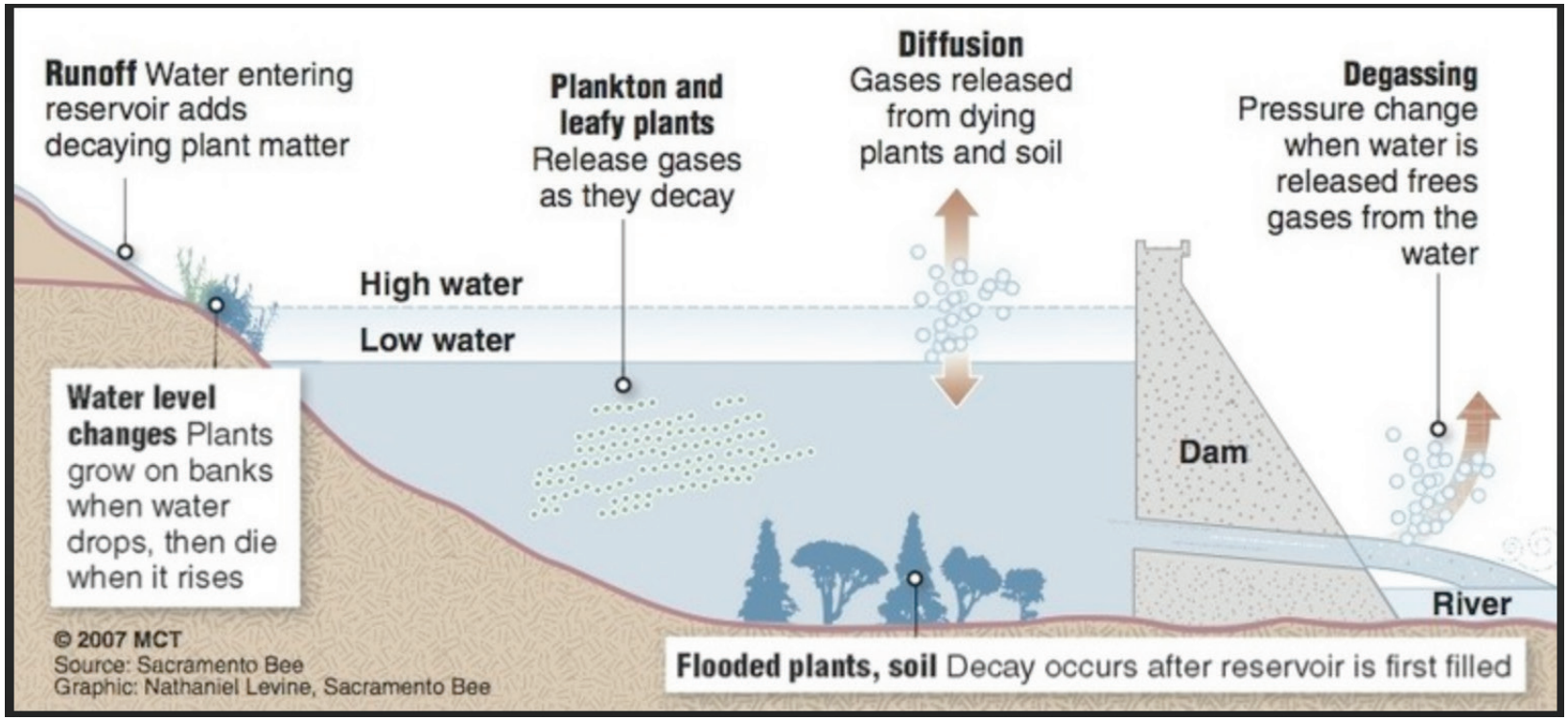
Greenhouse Gases from Hydroelectricity



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Hydroelectricity is not Emission Free

One kWhr of coal-based electricity releases 1090 gm of CO_2

One kWhr of hydro-based electricity releases 225 gm of CO_2 equivalent

One litre of gasoline releases 3.00 kg of CO_2 from manufacture to consumption in a vehicle

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So, What is the bottom line?

- Efforts in the electric power sector by replacing fossil fuel with renewables and nuclear will help
- But if emission from the transportation sector continues to rise, the power sector contributions will not be enough
- Large scale Electric Vehicle deployment will help, but question remains – how will the EV be powered

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- PES Corporate Engagement Program
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Thank You

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