On “Asian Super Grid”

Japan Renewable Energy Foundation

Launching Experts’ Meeting

September 14, 2011

Takashi KIKUCHI

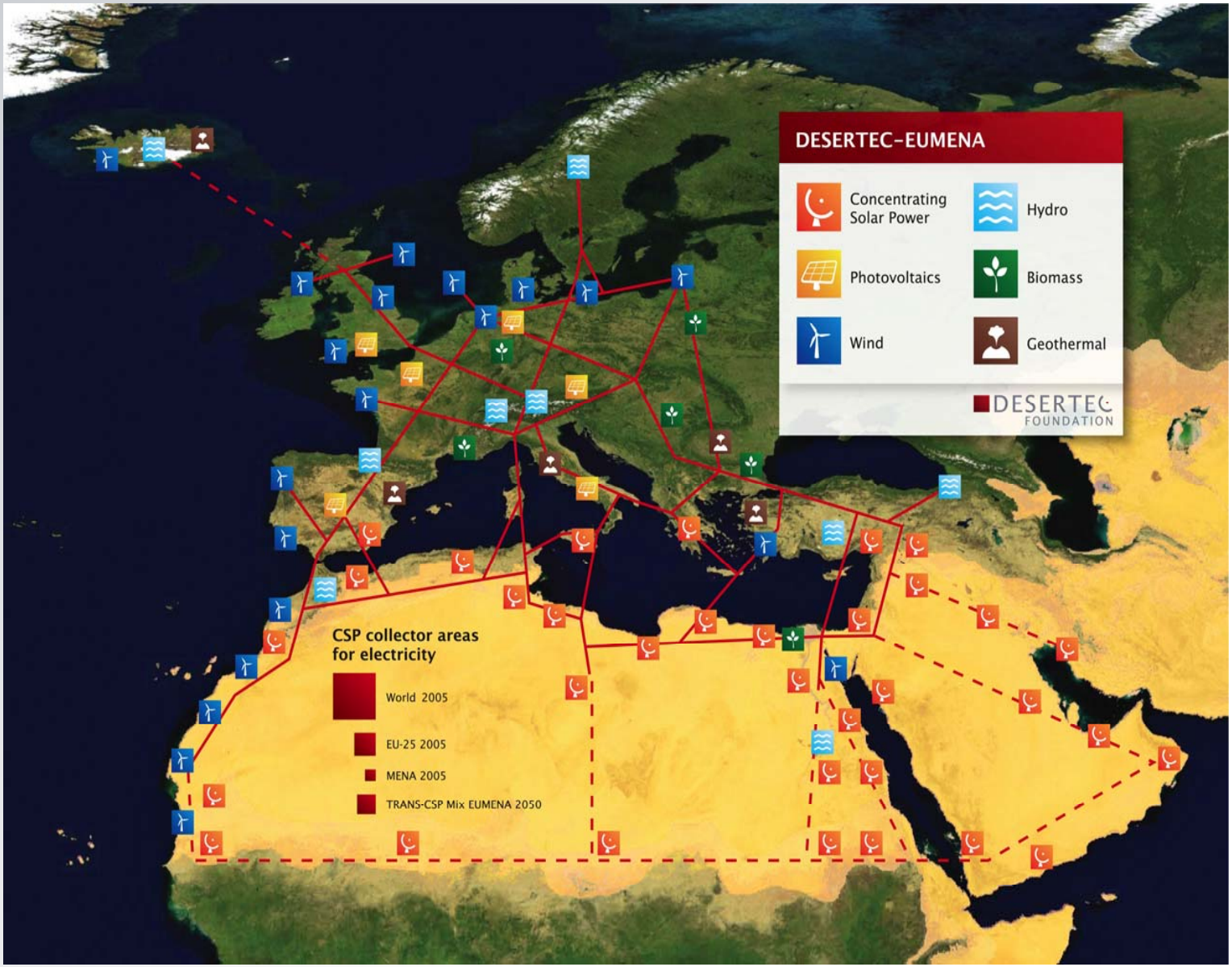
DESERTEC Coordinator Japan

Fellow at the Center for the Study of World Civilizations,

Tokyo Institute of Technology

DESERTEC FOUNDATION

DESERTEC Initiative

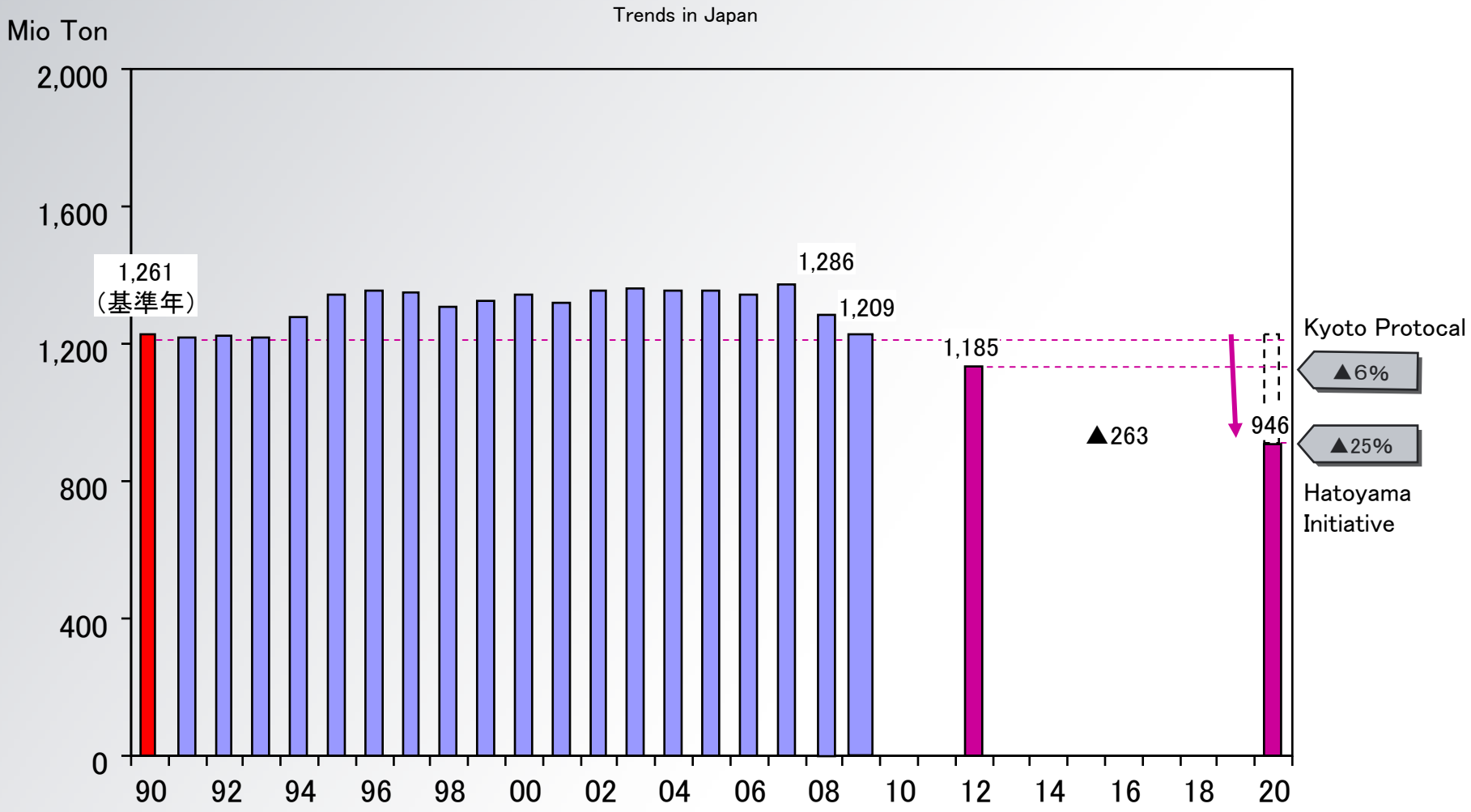


11.9.7

出典：DESERTEC財団

DESERTEC FOUNDATION

CO2 Emission : Japan

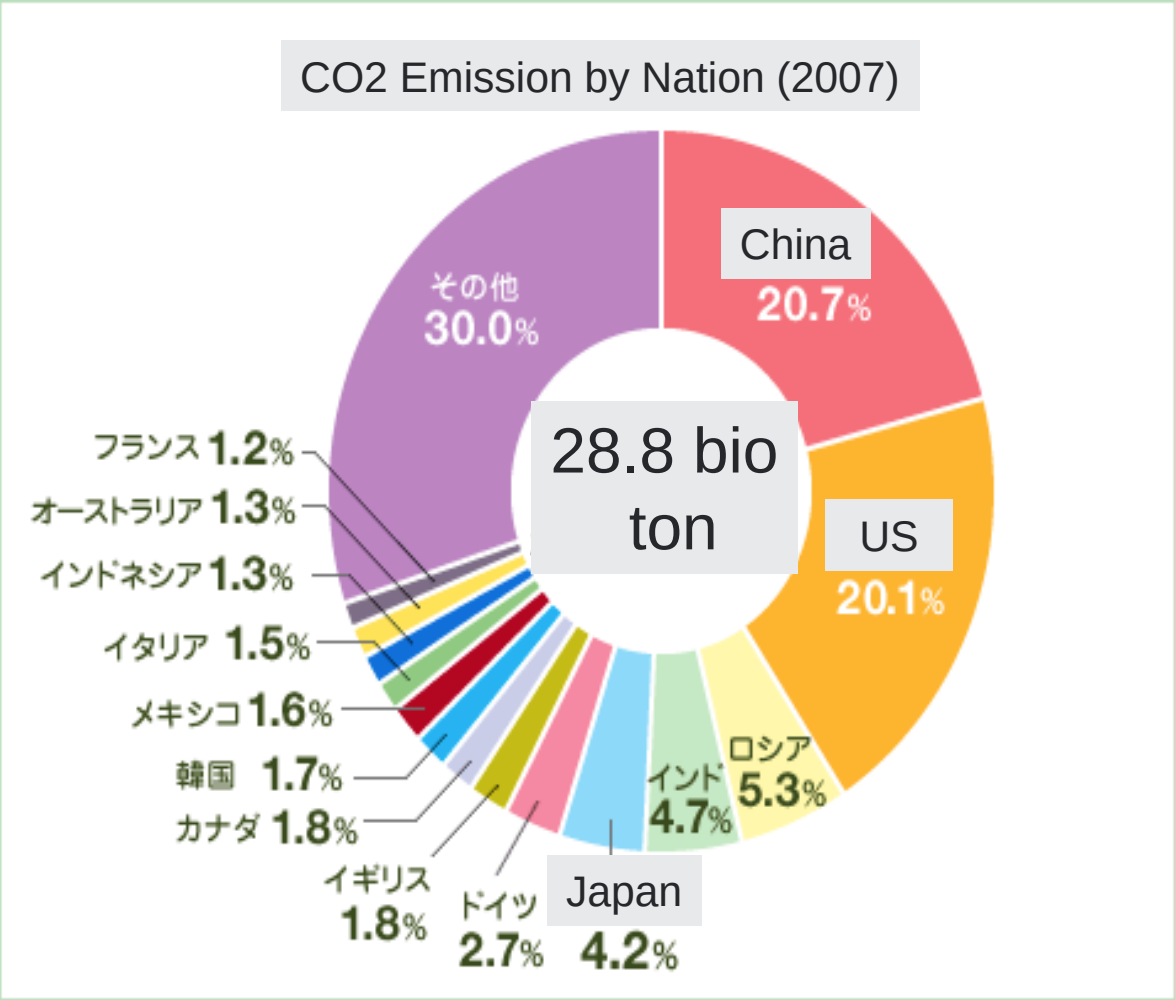


11.9.7

出典:環境省

DESERTEC FOUNDATION

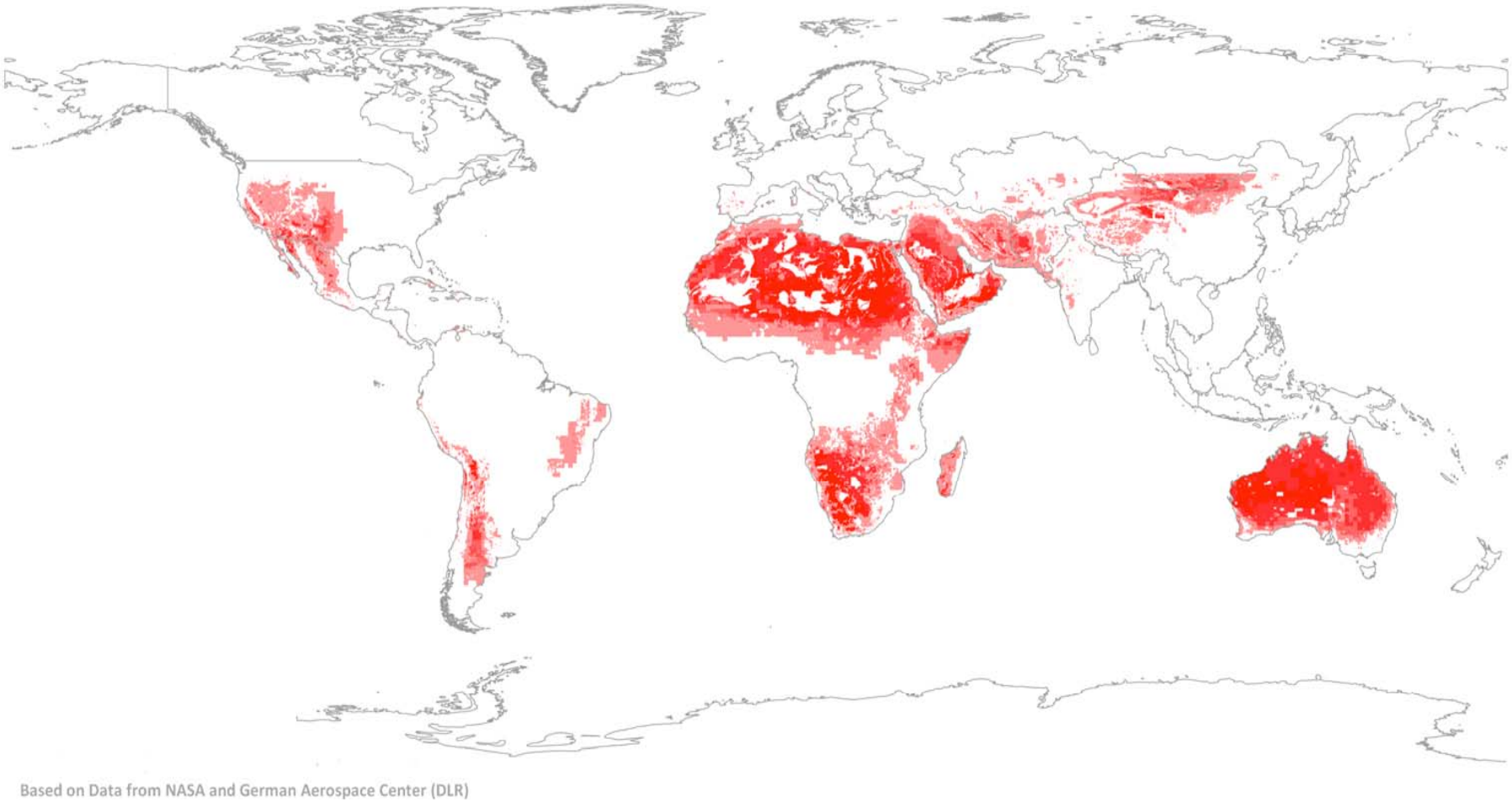
CO2 Emission



出典：EDMC/エネルギー・経済統計要覧(2010)

DESERTEC FOUNDATION

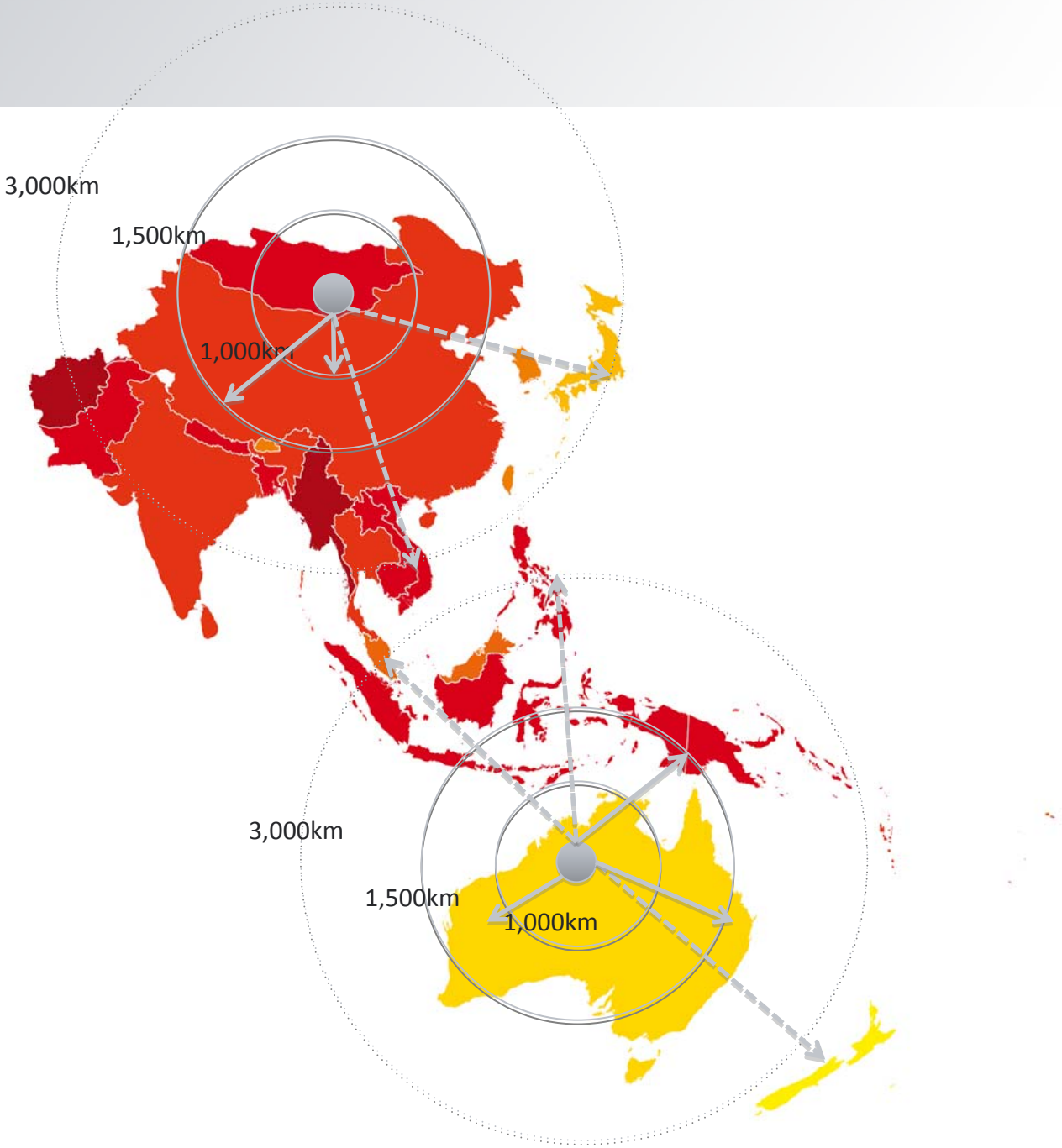
Sunbelts



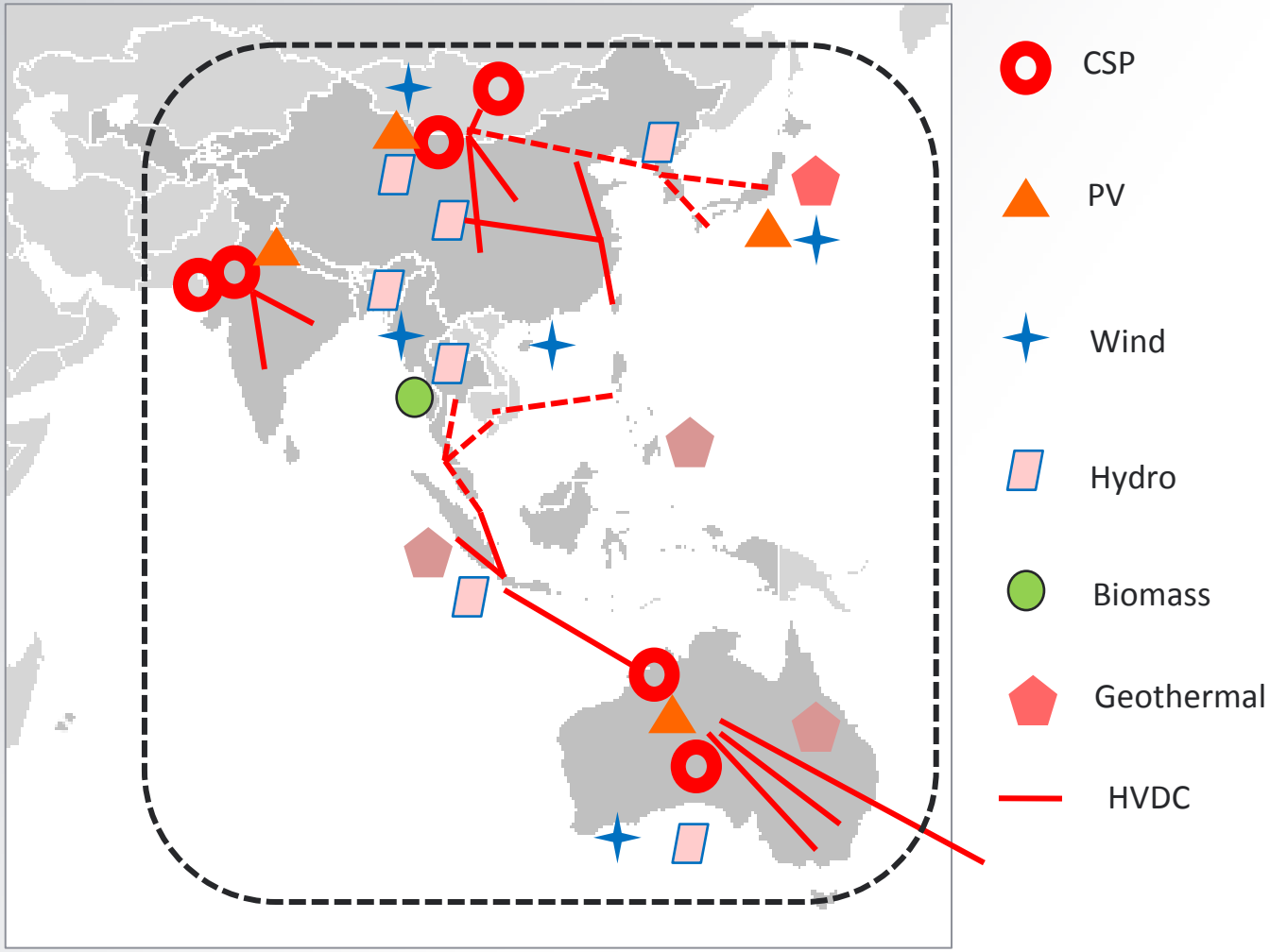
11.9.7

出典：DESERTEC財団

DESERTEC FOUNDATION


3,000km
1,500km
1,000km
3,000km
1,500km
1,000km

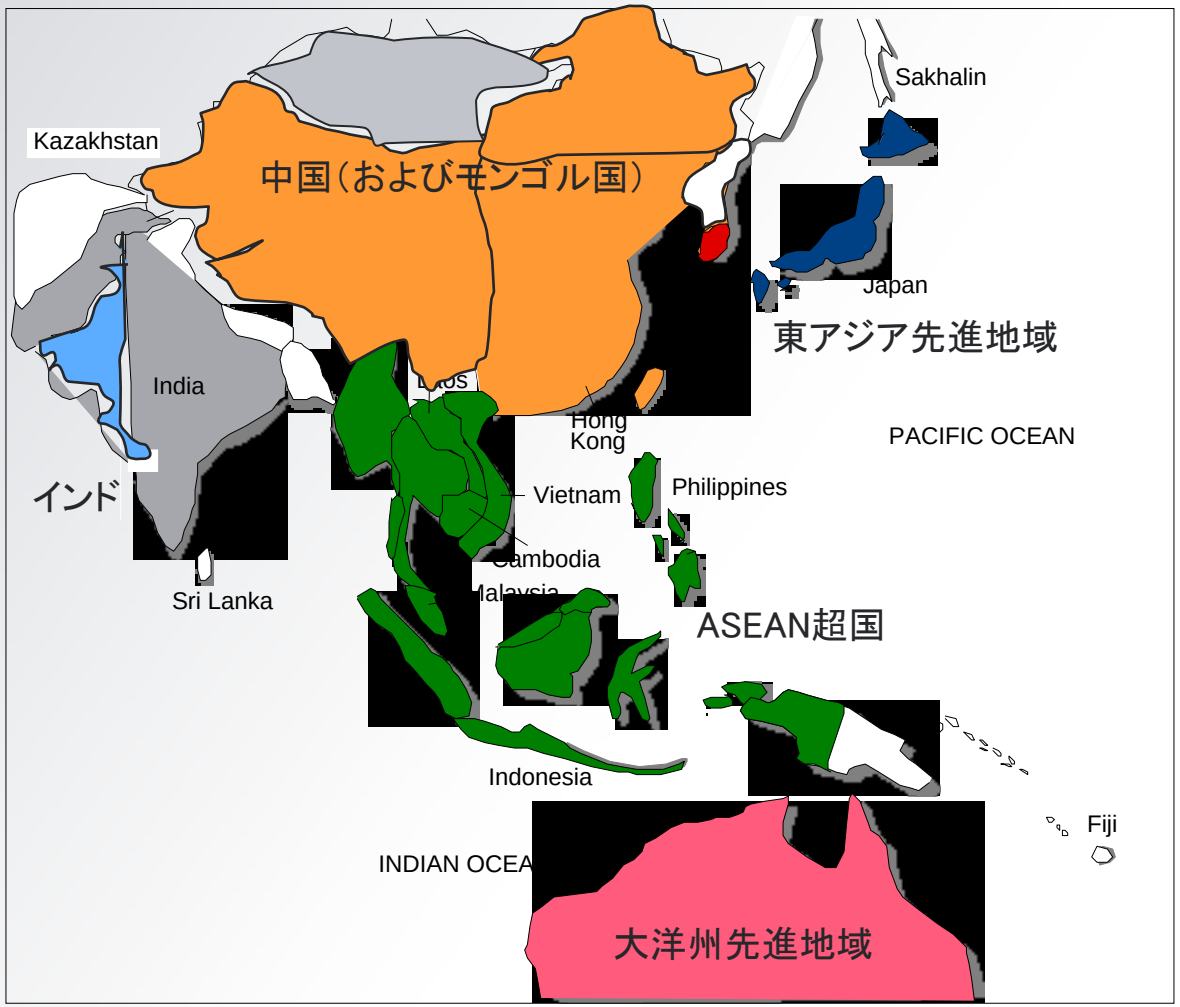
Visualizing “Asia Pacific Super Grid”



11.9.7 出典：筆者作成

DESERTEC FOUNDATION

Visualizing “5 Areas”



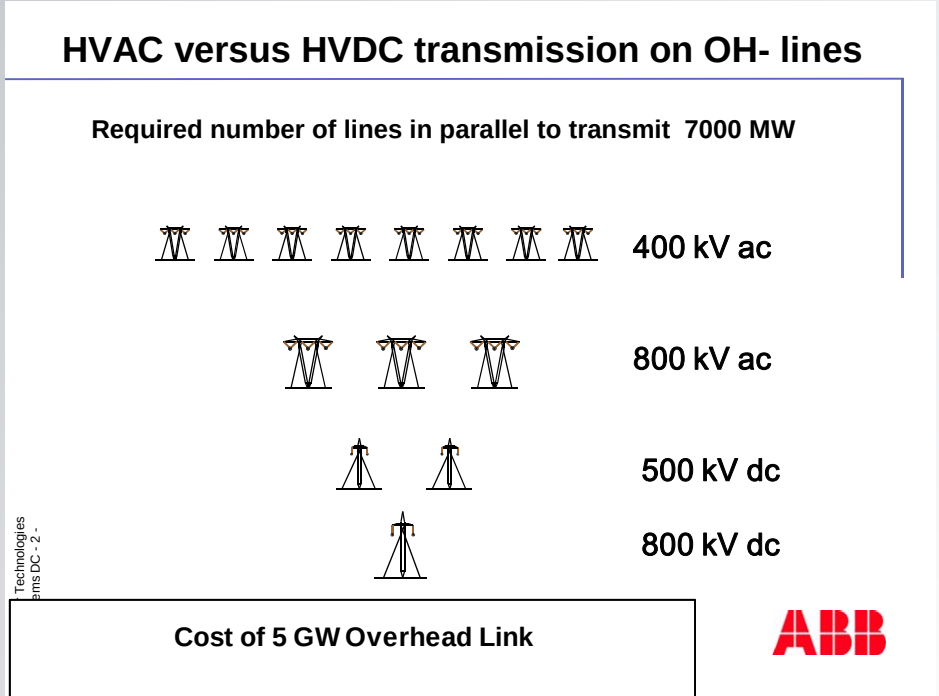
11.9.7 出典：筆者作成

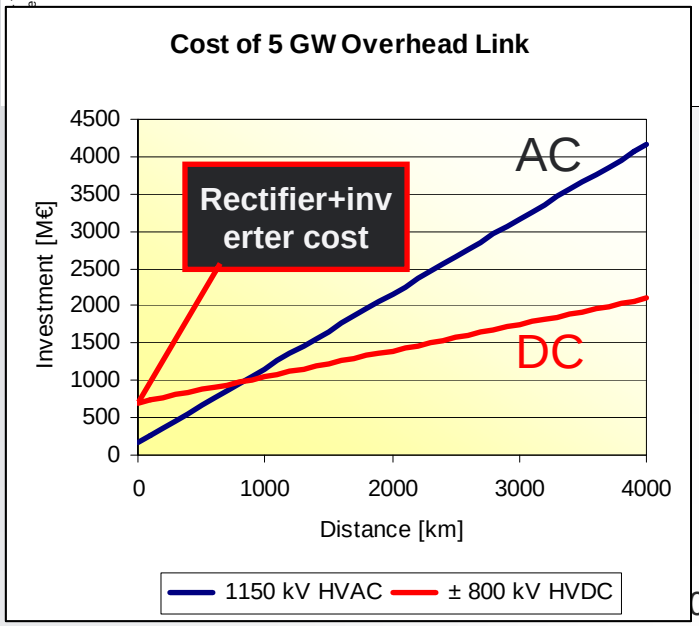
DESERTEC FOUNDATION

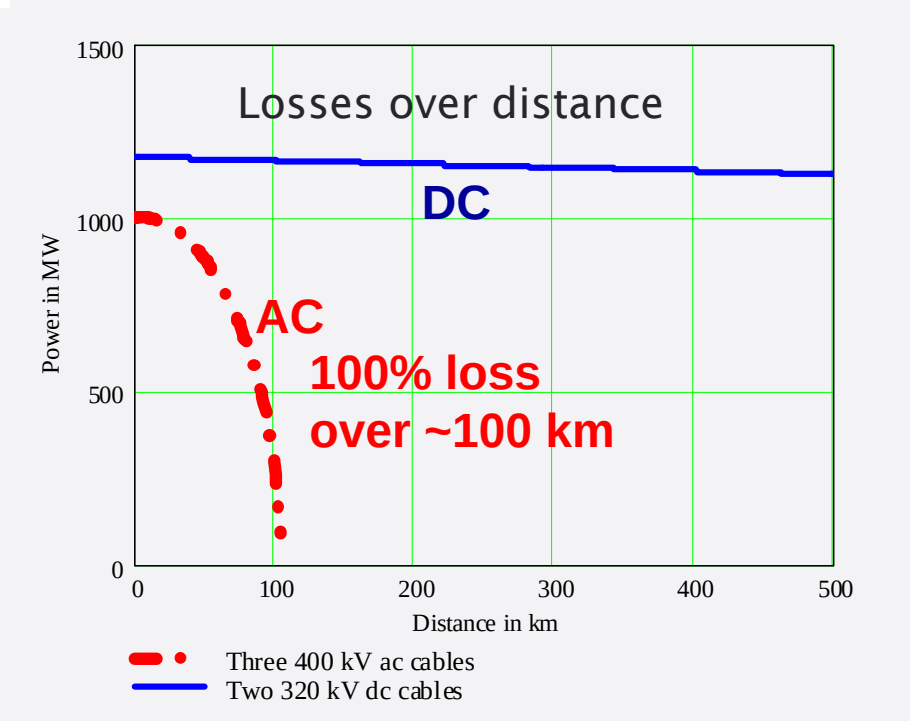
Low-Loss Long-Distance Transmission by HVDC

Loss = $\delta W/W \sim 1/U^2$

Cables, (under ground, submarine)
High capacity, AC impossible







In favor of DC over AC:

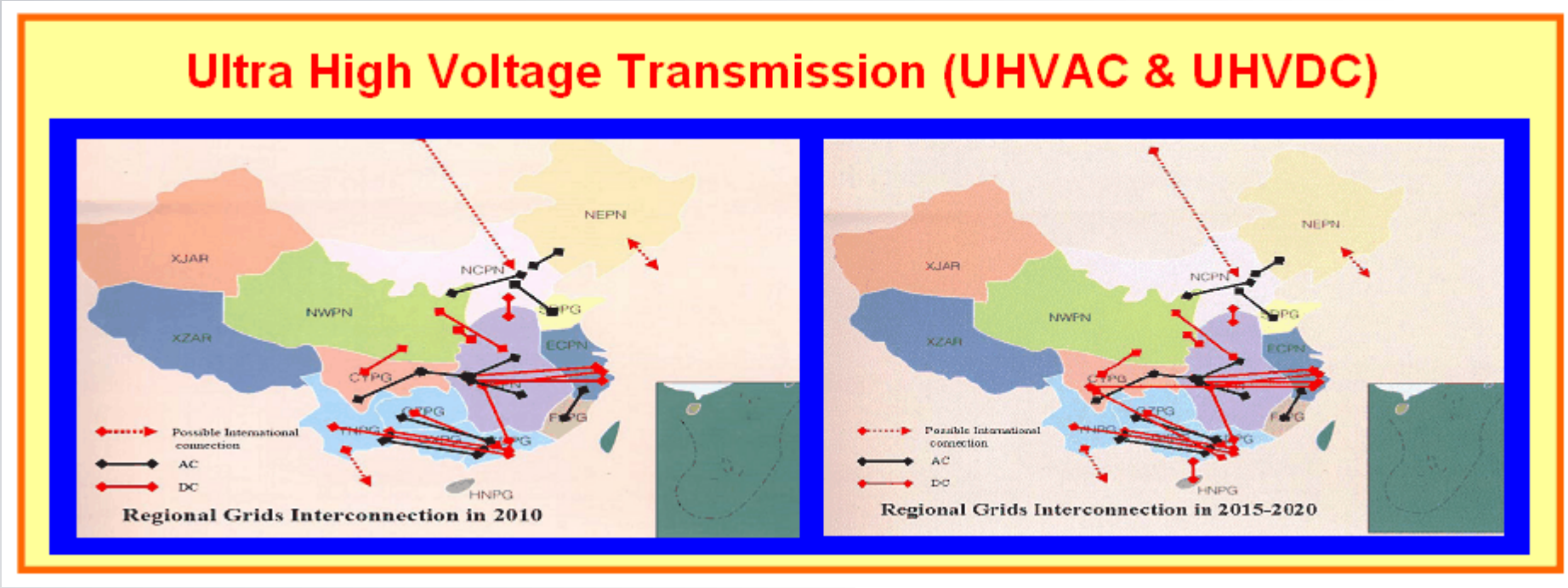
1. un-limited reach (cables, no rad.)
2. lower losses/km (always Vmax)
3. lower power line costs/GW
4. lower space demand/GW

DESERTEC FOUNDATION

EU-MENA Grids

DESERTEC FOUNDATION

Physical Delivery: Transmission in China



China

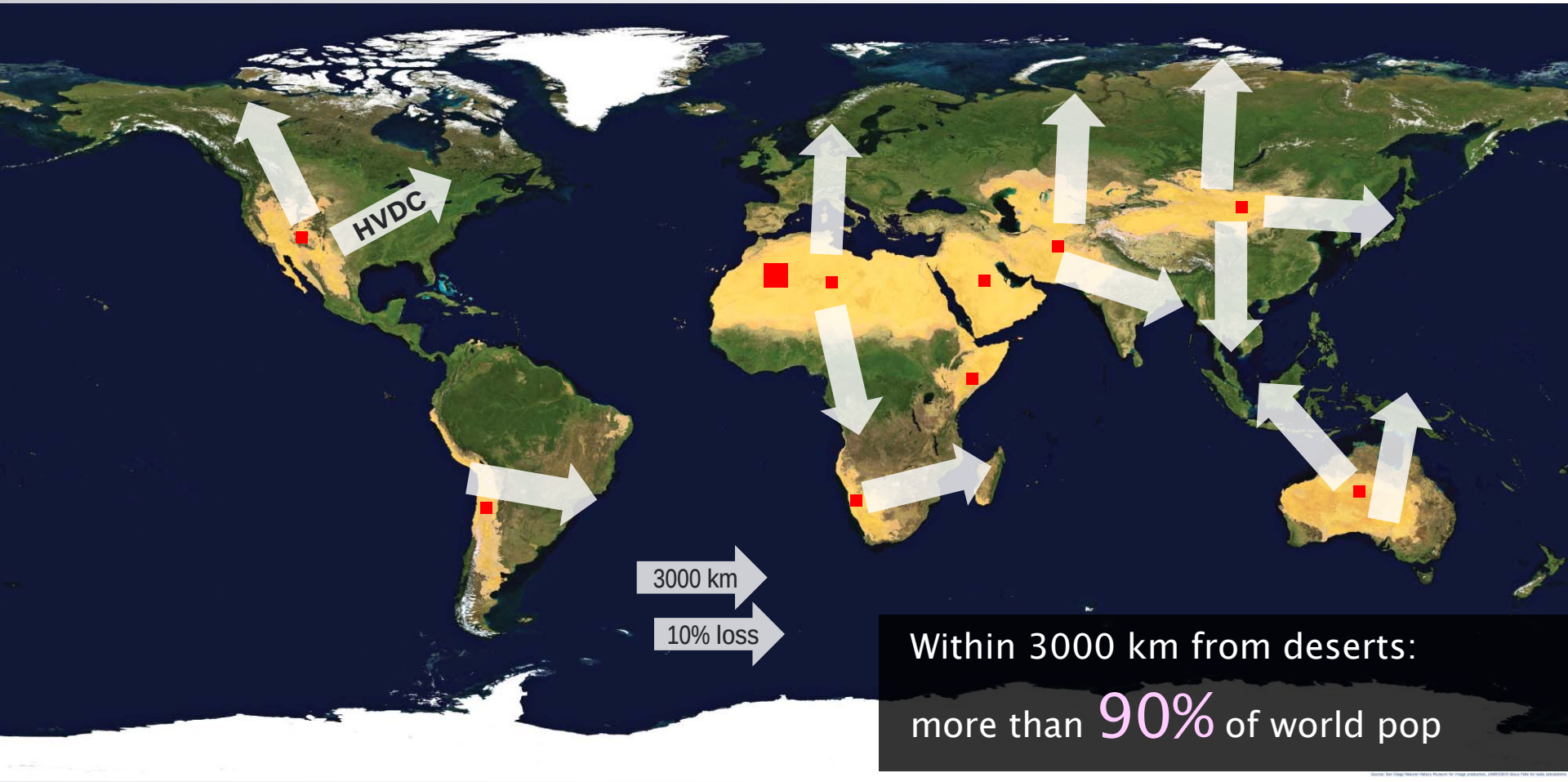
- The world's largest scale of UHV;
- Valuable experiences of international cooperation and deployment;
- Uplifting the ability of domestic industry to participate into international projects

	Location	Technology	Capacity	Circuit Length
JNJ	Jindongnan-Nanyang-Jingmen	UHVAC, 1000KV	6000 MVA	654 km
YG	Yunnan-Guangdong	UHVDC, ±800KV 12 pulses, bipole	5000 MW	1438 km
XS	Xianjiaba-Shanghai	UHVDC, ±800KV 12 pulses, bipole	6400 MW	1907 km
JS	Jinping-Sunan	UHVDC, ±800KV 12 pulses, bipole	7200 MW	2096 km

http://www.aepfm.org/link.php

The Worldwide Solution

Connect expected world population by HVDC super grid to good desert sites



Within 3000 km from deserts:

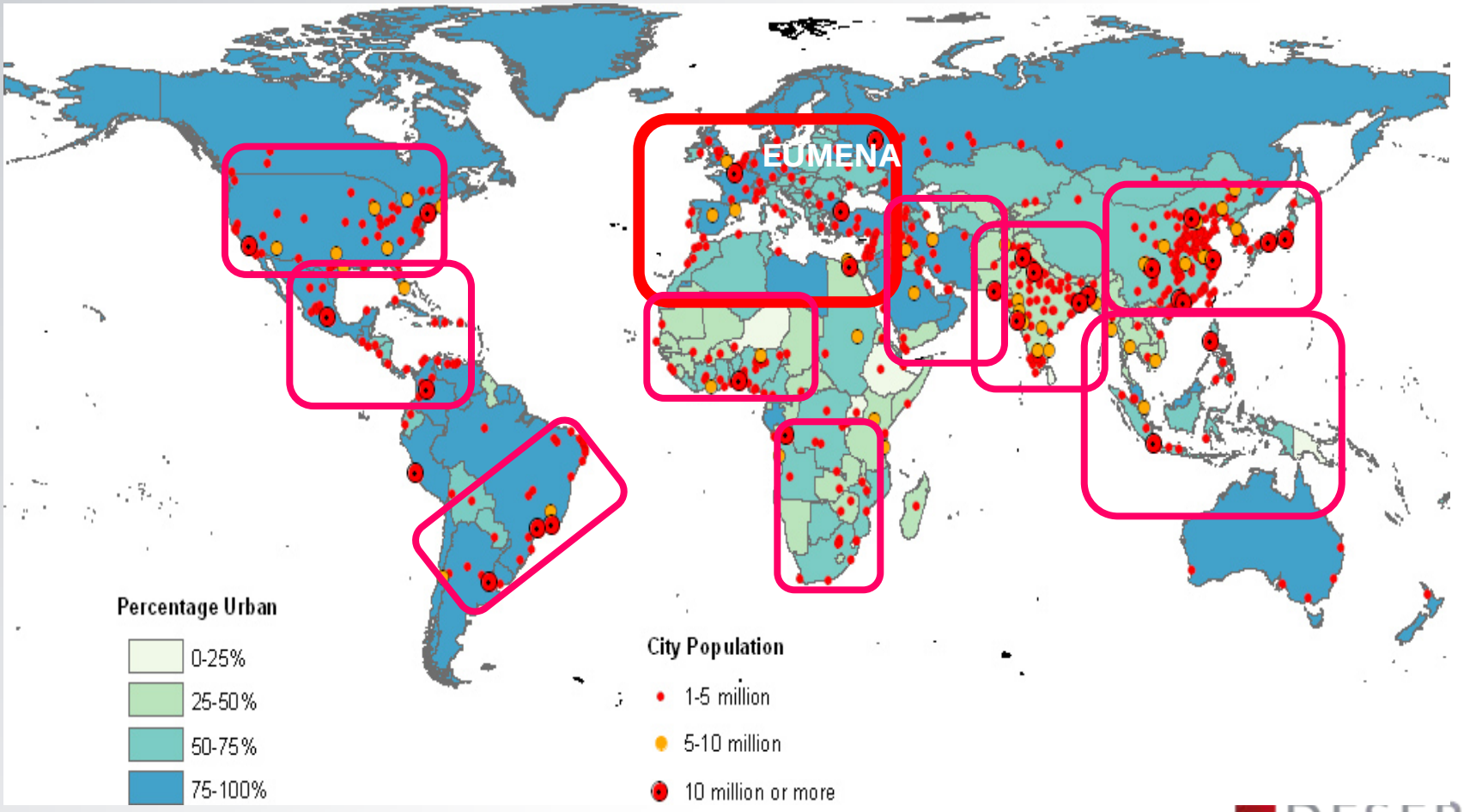
more than 90% of world pop

DESERTEC Develops Global Solar Plan

10 Important demand regions for DESERTEC

Frames include good desert sites

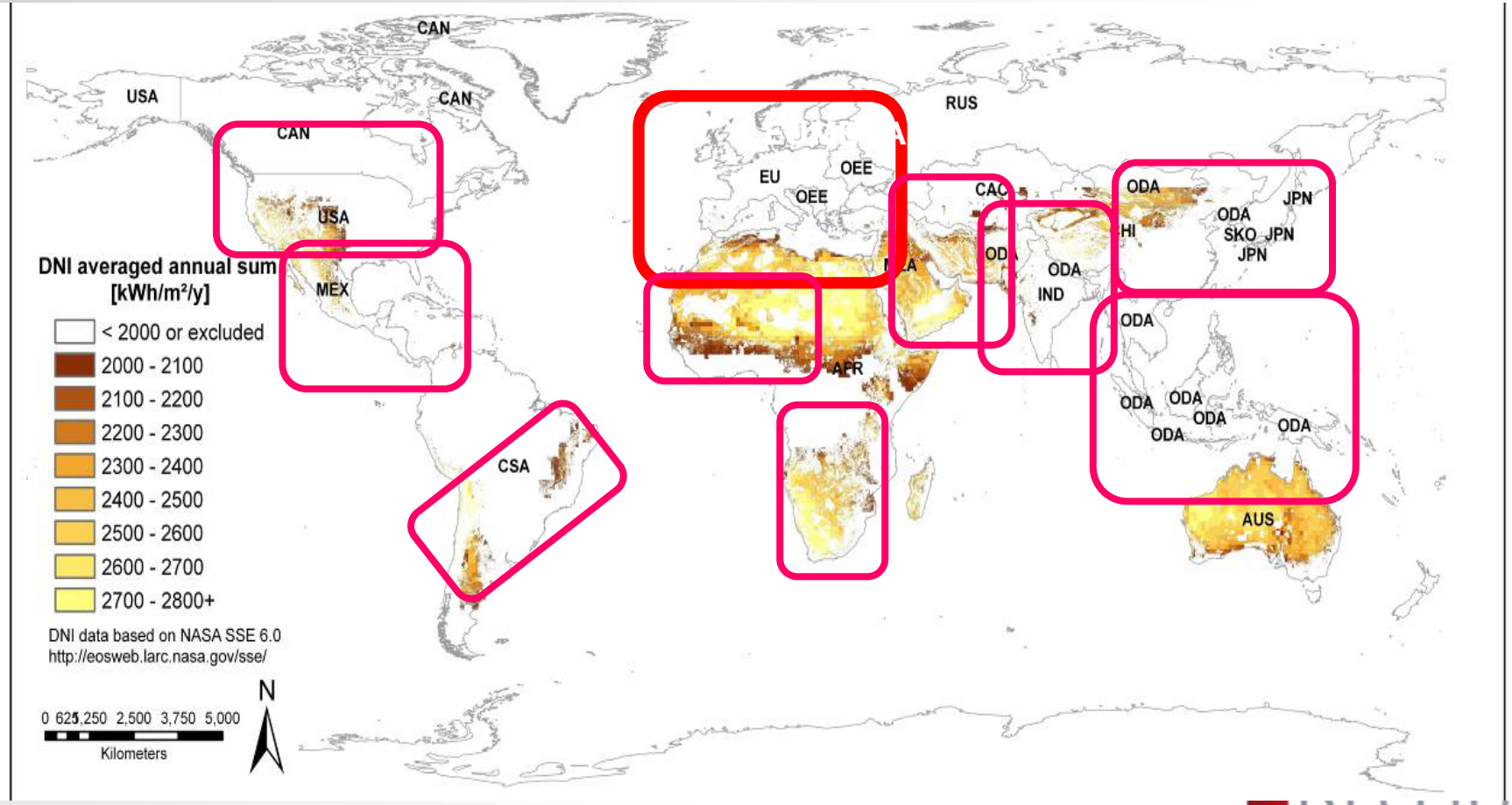
urban population expected for year 2025



DESERTEC Develops Global Solar Plan-2)

10 Important demand regions for DESERTEC

urban population expected for year 2025



Could CSP be commercialized in Japan?

Experiment Plant in Nio, Kagawa

出典：http://www.suga-ac.co.jp/works /win/civil02.html

DESERTEC FOUNDATION

Takashi KIKUCHI
+81 (0)90-2559-7800
kikuchi@cswc.titech.ac.jp