



自然エネルギー財団

JAPAN RENEWABLE ENERGY FOUNDATION

# Asia Super Grid Opportunities and Risks

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**Shuta Mano**

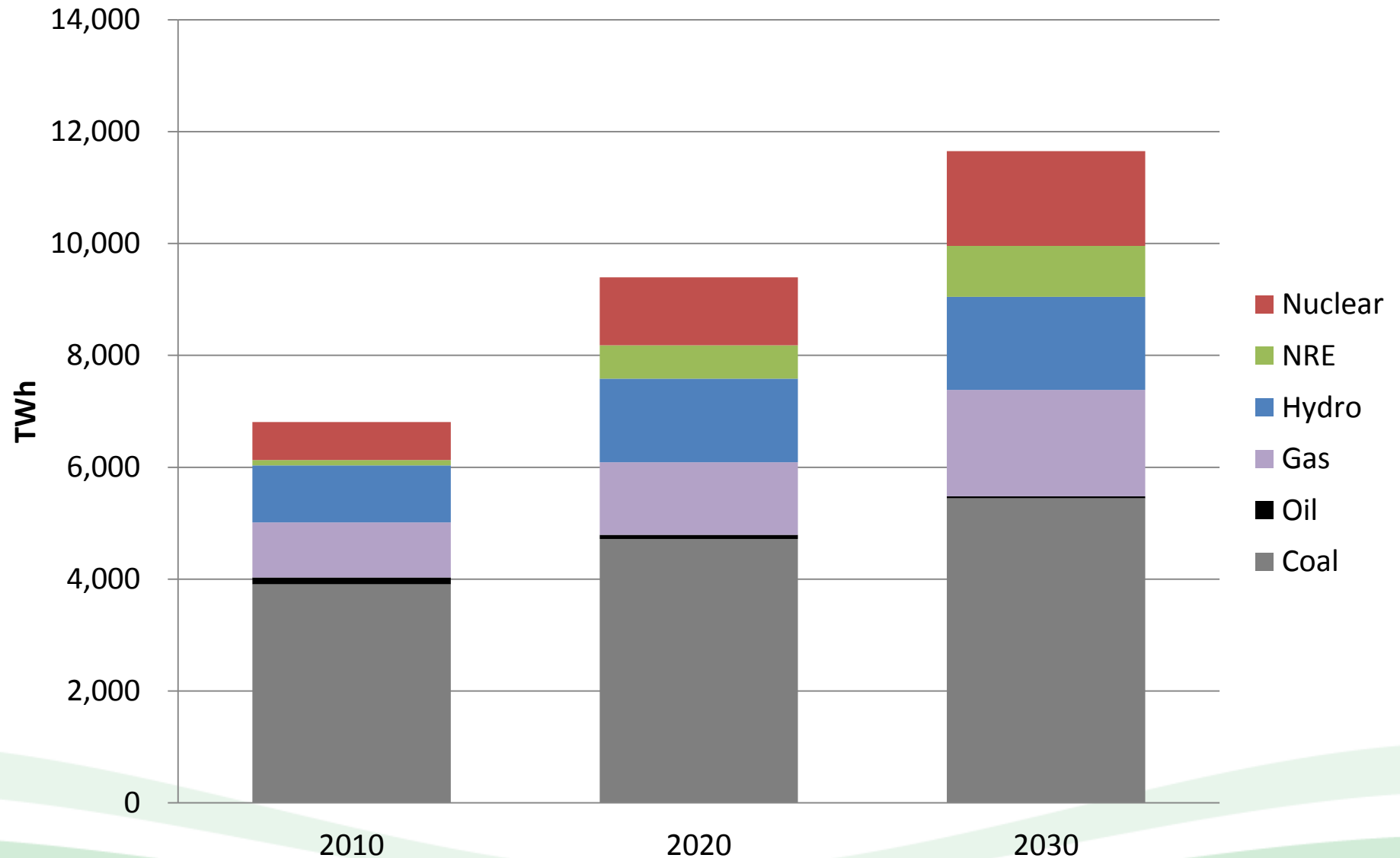
**Japan Renewable Energy Foundation**



# OPPORTUNITIES OF ASG

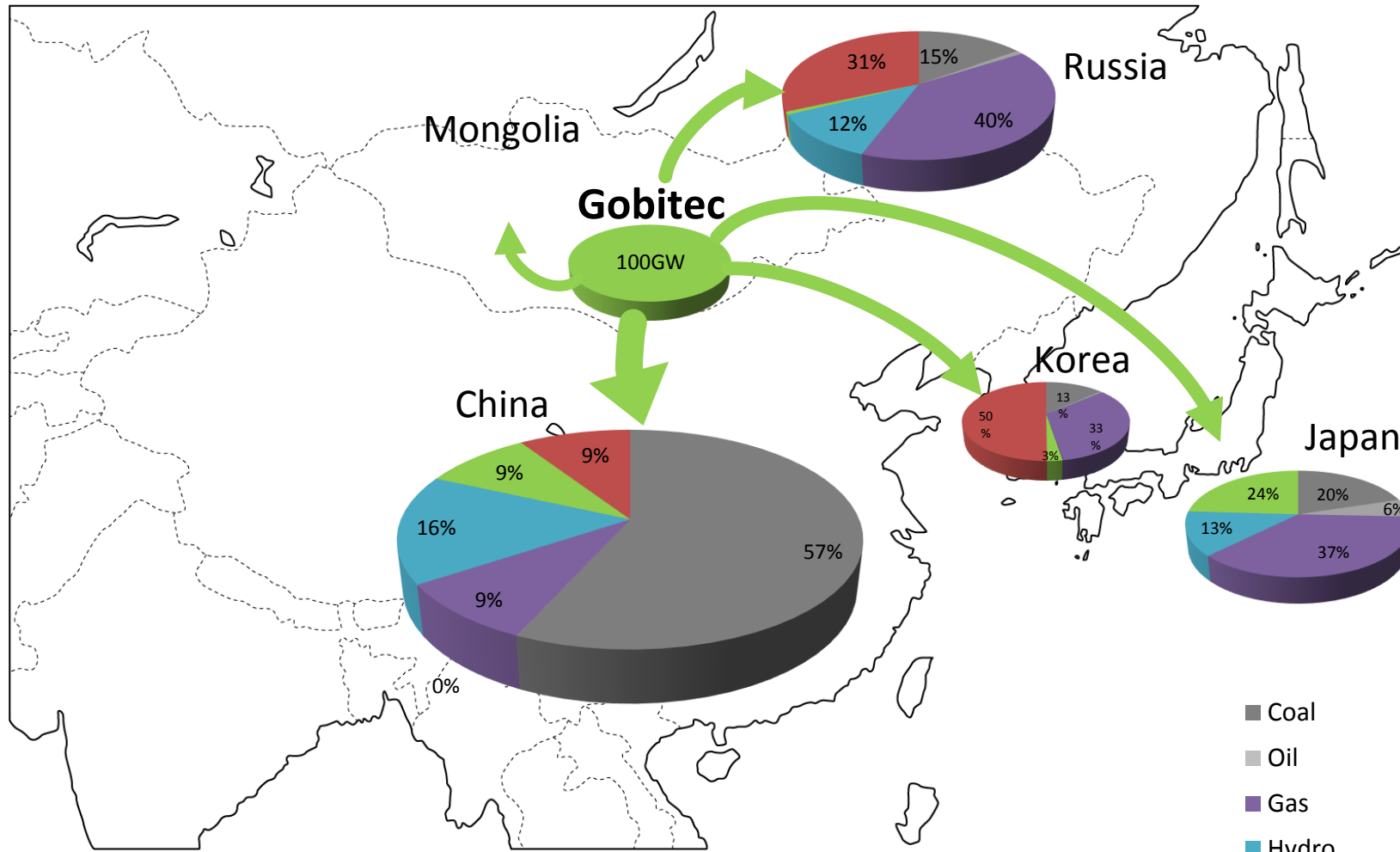
Based on the report, *“Gobitec and Asian Super Grid from Renewable Energies in Northeast Asia, 2014”*

# Electricity demand of Northeast Asia (BAU)



Source: Gobitec and Asian Super Grid from Renewable Energies in Northeast Asia, 2014

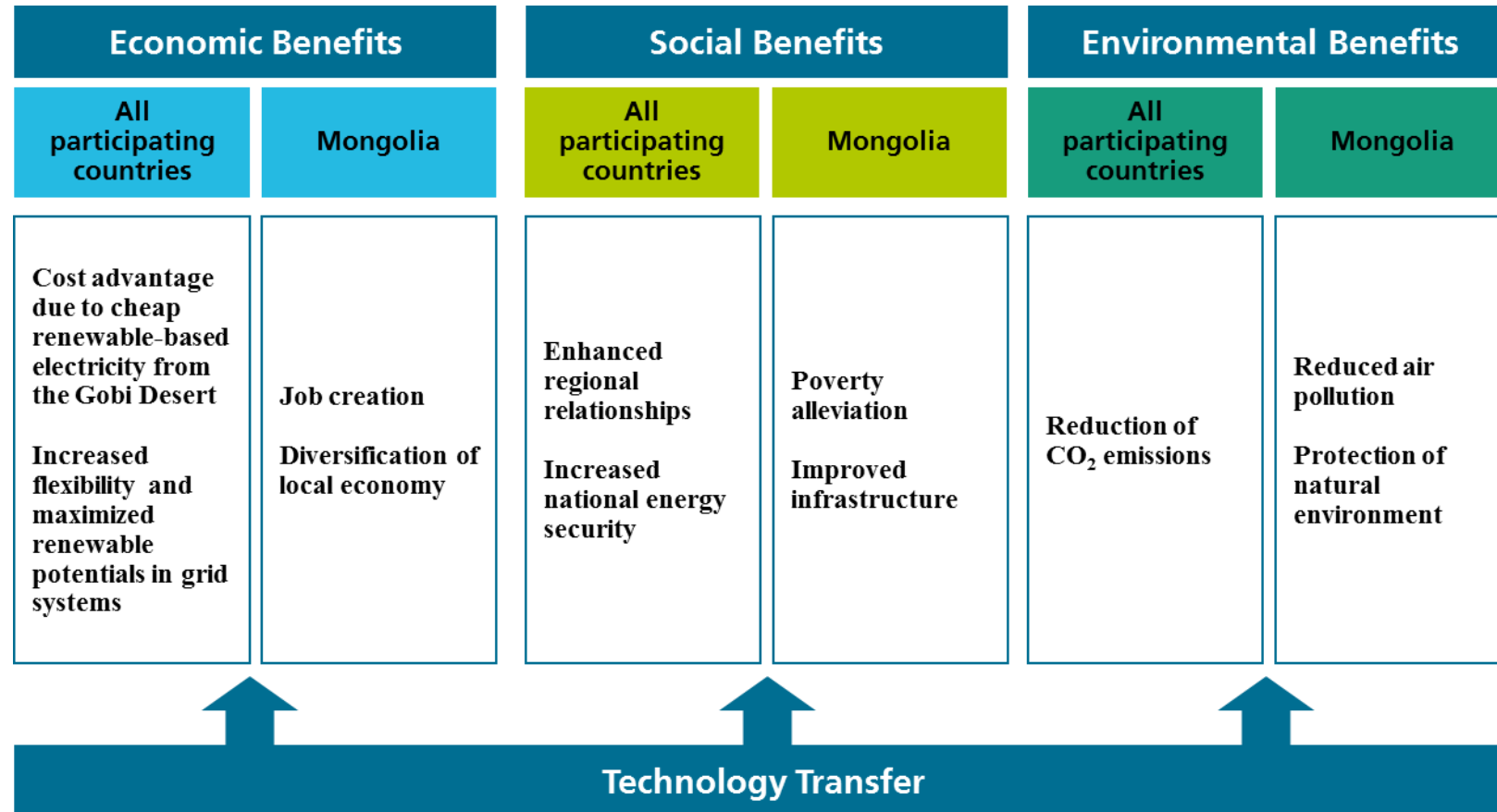
# Generation mix of 2030 and RE imports from Gobitec



\*Generation mix is based on 2030 BAU forecast.  
\*Japan: Scenario of phasing-out nuclear by 2030

Source: Gobitec and Asian Super Grid from Renewable Energies in Northeast Asia, 2014

# Benefits of regional grid integration



Source: Gobitec and Asian Super Grid from Renewable Energies in Northeast Asia, 2014

## ■ Economic benefits for Mongolia

- Employment effects by manufacturing/construction/installation/O&M for Wind, PV and transmission lines.

Employment and Income effects by 100GW PV and Wind from 2015 to 2030

Direct employment	880,000
Income generated by projects	9 billion USD

## ■ Economic benefits for Northeast Asia

- Economic benefits through importing low-cost electricity from wind and PV in Gobi desert

Total Supply Unit Cost from Wind and PV
0.056–0.168USD/kWh



Wholesale Electricity Price in Japan	0.113USD/kWh
Weighted Average Electricity Charge	0.115– 0.136USD/kWh

Source: Gobitec and Asian Super Grid from Renewable Energies in Northeast Asia, 2014



## Increased flexibility of grid system

1) Greater spatial dispersion and portfolio diversification of VRE

2) Greater access to dispatchable power plants and storage facilities

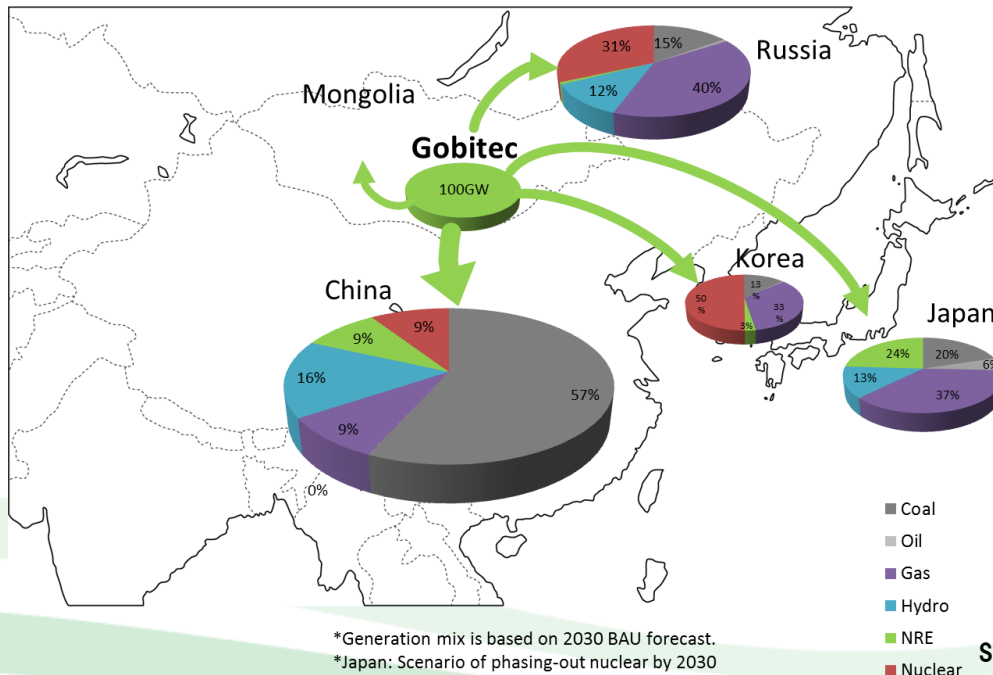
3) Greater potential for demand smoothing across different time zones

# Environmental benefits



## CO<sub>2</sub> Emission Reduction by 100GW PV and Wind

	Unit	Korea	China	Japan	Mongolia	Total
CO <sub>2</sub> emissions per kWh from electricity (2010)	tCO <sub>2</sub> /MWh	0.533	0.766	0.510*	1.492	-
Emission Reduction	GtCO <sub>2</sub>	21	149	13	4	187



Source: IEA CO<sub>2</sub> Emissions from Fuel Combustion 2012  
\*Japan: 2011 emission factor,  
The Federation of Electric Power Companies of Japan

Source: Gobitec and Asian Super Grid from Renewable Energies in Northeast Asia, 2014





# RISKS OF ASG

## ■ Energy security concern

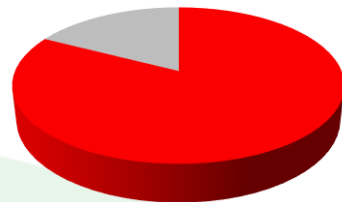
- Low energy self-sufficiency
- Electricity import from NE Asia will help to diversify energy supply
- ASG will help the increase of domestic RE through the integration of grid

### Primary Energy Self-Sufficiency in Each Countries

	Korea	China	Russia	Japan	Mongolia
Total energy self-sufficiency	2.5%	90.6%	177.9%	4.9%	457,1%

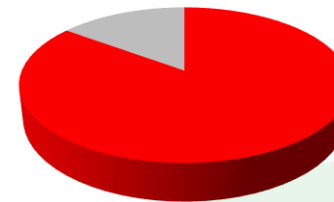
Source: IEA Energy Balances of OECD Countries 2012, Energy Balances of non-OECD Countries 2013

韓国



中東  
83%

日本



中東  
85%

輸入原油の中東依存度

- Concern for cut-off risks in unforeseen circumstances
- There are ways to manage risks associated with a regional supply arrangements
  - Set the **maximum level** (eg. <10% of total capacity) of importing electricity under the level that importing countries can make up for the shortfall with their own reserved margins (8–10% of peak load)
  - Use international agreement to protect the investment
  - Establish **interdependence relationship** with exporting countries

## Generation Capacity and Importing Electricity from Gobi Desert

	Korea	China	Russia	Japan	Mongolia
Total Capacity in 2030	159GW	1,869GW	249GW	296GW	1.7GW
Importing Electricity	15GW	75GW	-	10GW	1GW
% of importing electricity against total capacity	<10%	<4%	-	< 3%	-
Current status of cross-border transmission lines	No	Yes	Yes	No	Yes

Source: data submitted by the Gobitec and ASG project partners