

The background of the slide is a photograph of a large number of white wind turbines in a field, stretching into the distance under a clear blue sky. The turbines are arranged in rows, and the perspective is from a low angle, looking up at the blades of a turbine in the foreground.

**IEEE International Conference on Smart Grid
Engineering (SGE'12)**

27-29 August, 2012

UOIT, Oshawa, Canada

*Integration of Wind Power
Global Renewable Energy Grid-GREG*

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Integration of Wind Power Global Renewable Energy Grid-GREG

The issues & Answers

The Vision

Mohammed Safiuddin



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The Issues & Answers

NIMBY Factor

The Birds

The Radars

Grid Integration

Power Restoration After Blackout



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The Issue NIMBY [Not In My Back Yard] Factor:

The Answer:- Education

Exploitation of fear of the unknown by status quo proponents for their own commercial interests is the major force behind NIMBY. Educating the masses in schools and colleges to prepare the next generation for socially responsible energy conversion and consumption is needed.

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The Issue: The Birds

The Answer:- Planning

Cleaner air is as important to birds as it is to humans. So, use of wind energy to minimize pollution from fossil fuel plants is in the best interests of the birds. With optimal planning and design, with respect to migration paths of the birds, harm to them can be minimized.

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The Issue: The Radars

The Answer:- “Stealth turbines”

A world-leading Vestas research project is drawing on military expertise, in hiding ships and aircraft from radar, to make life easier for wind farm developers.

by Charles Butcher

<http://www.vestas.com/en/media/article-display.aspx?action=3&NewsID=1956>

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The Issue:-The Grid Integration

The Answer:- Separate DC Bus

A separate HVDC transmission system for all large renewable energy, wind and solar, power plants would minimize dynamic fluctuations at the grid and allow for smoother integration with the existing transmission assets.

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The Issue: Power Restoration After Blackout

The Answer:- Intelligent Substations

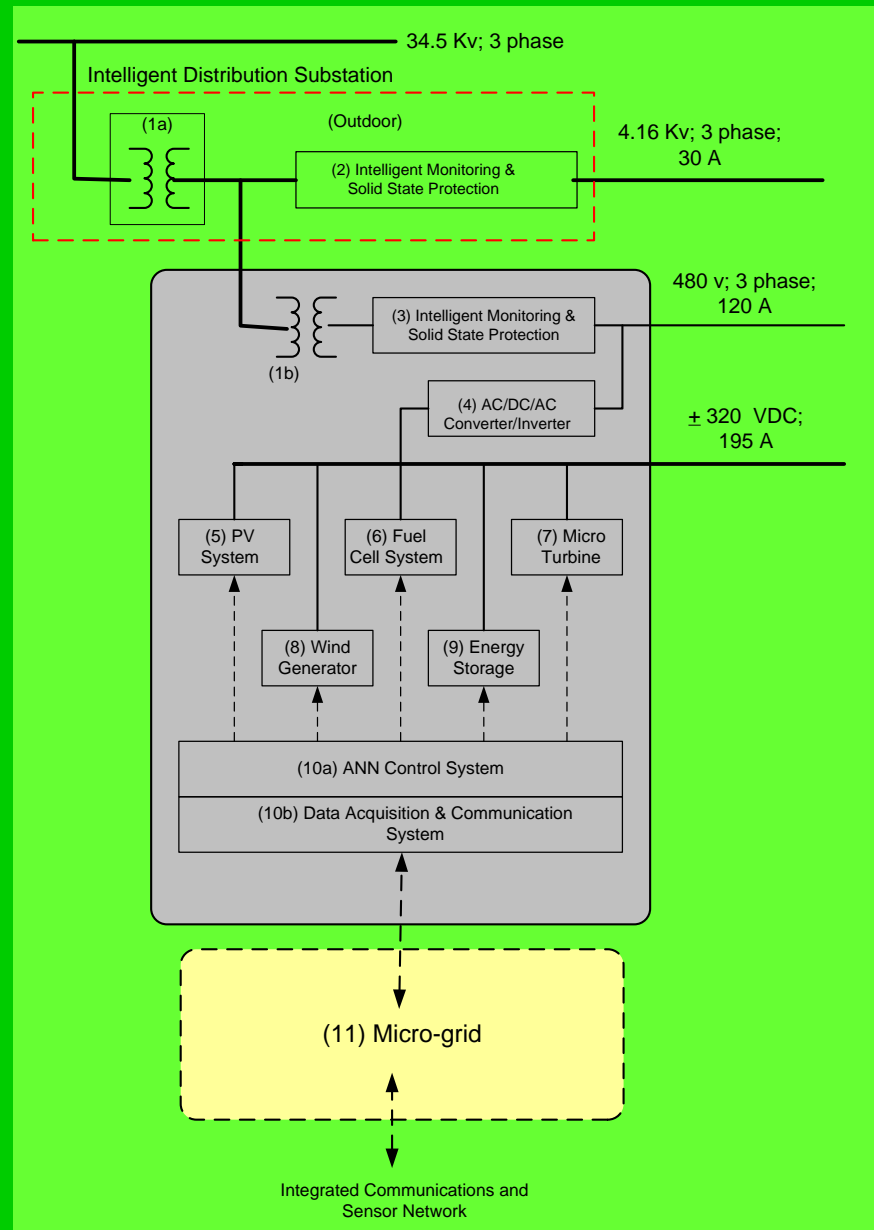
Intelligent substations with artificial neural network [ANN] control systems would be needed to monitor and control feeders at the substations supplying active and passive loads, which may include small wind and PV power plants at customer ends

Intelligent Substation

- ANN control system
- Energy storage
- Micro-grid network
- SCADA system
- AC-DC-AC converters

<http://www.commentvisions.com/>

June 2010 Discussion



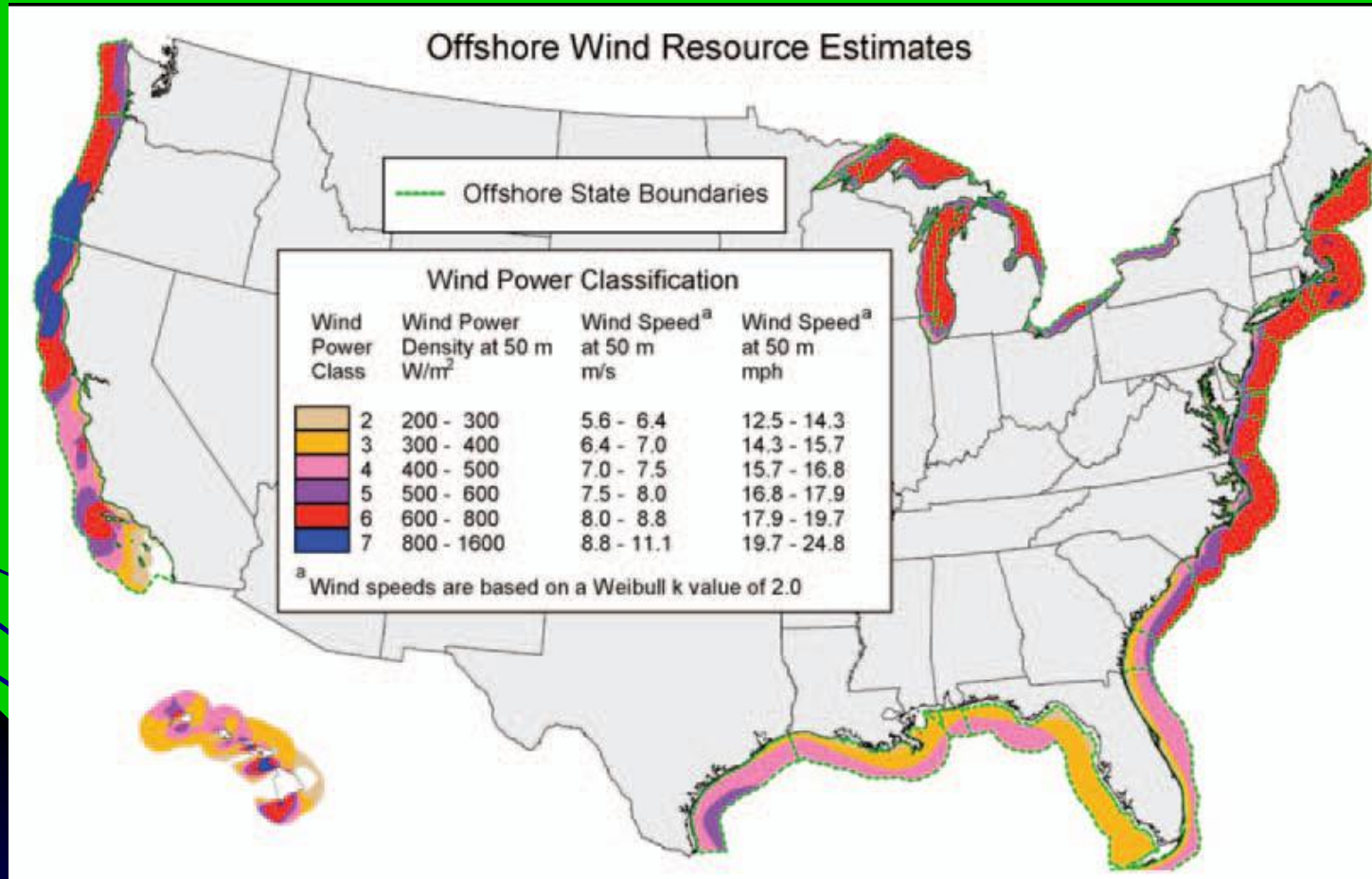
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New York Renewable Energy Grid



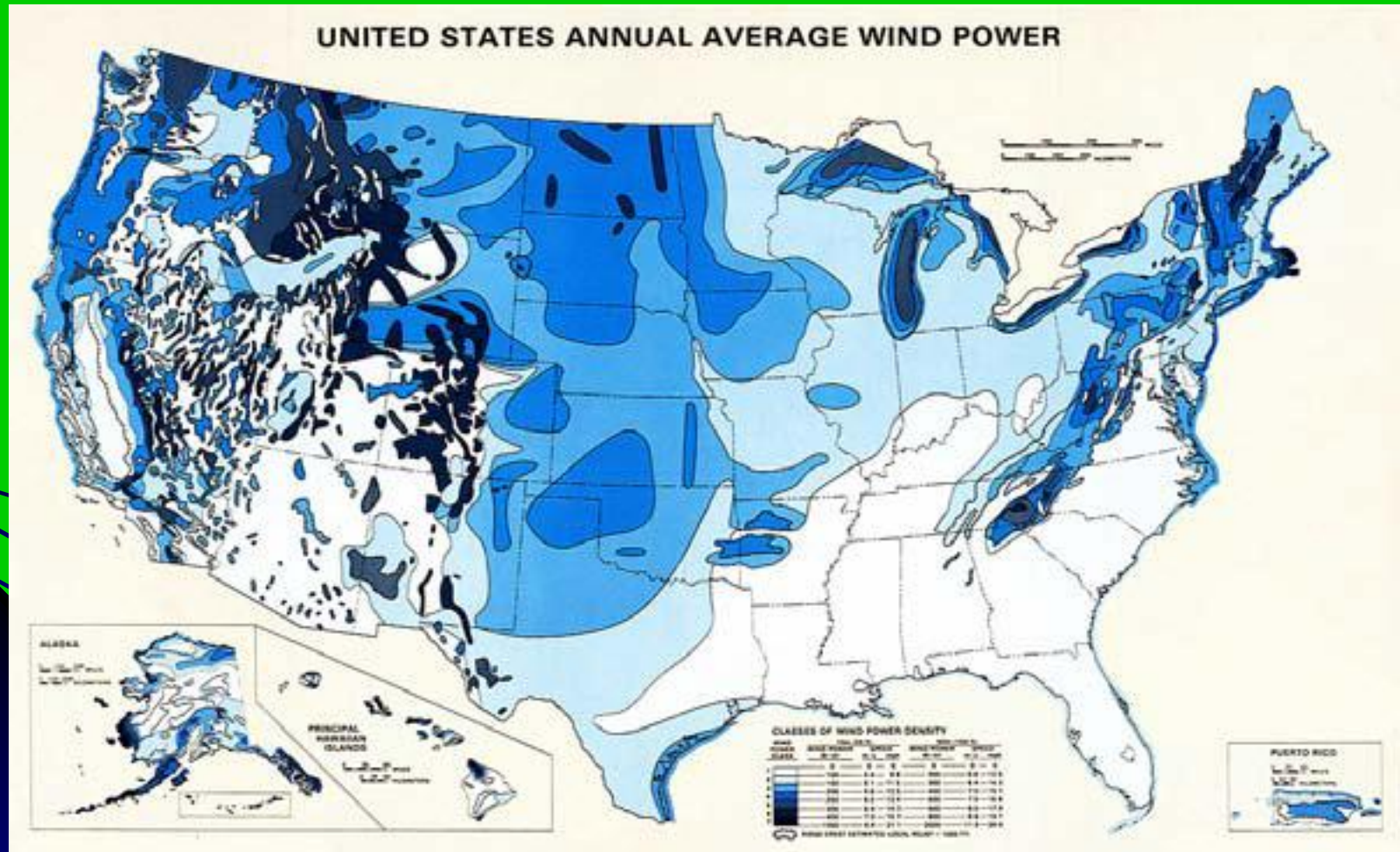
The Vision

National Renewable Energy Grid



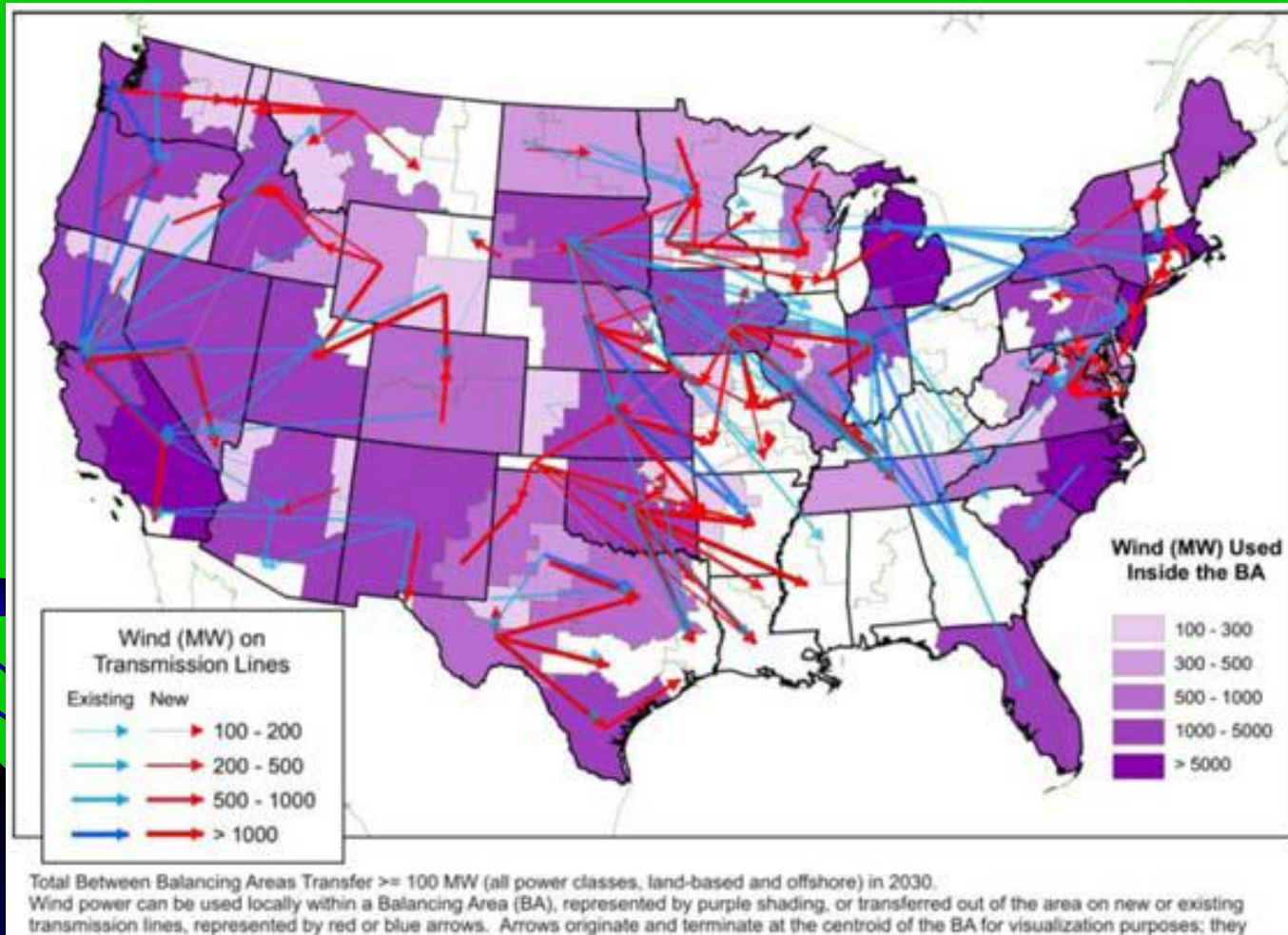
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National Renewable Energy Grid



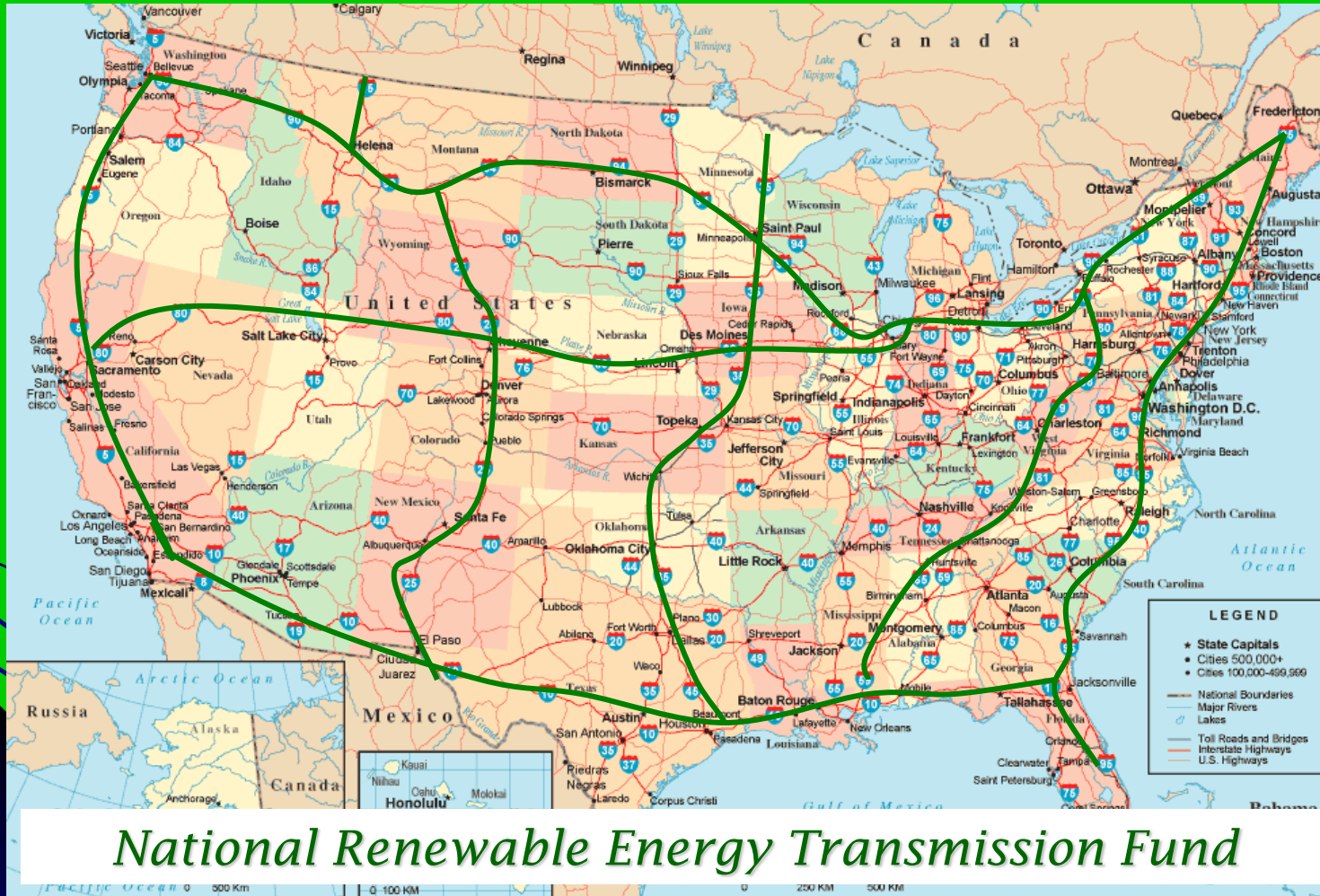
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National Renewable Energy Grid



The Vision

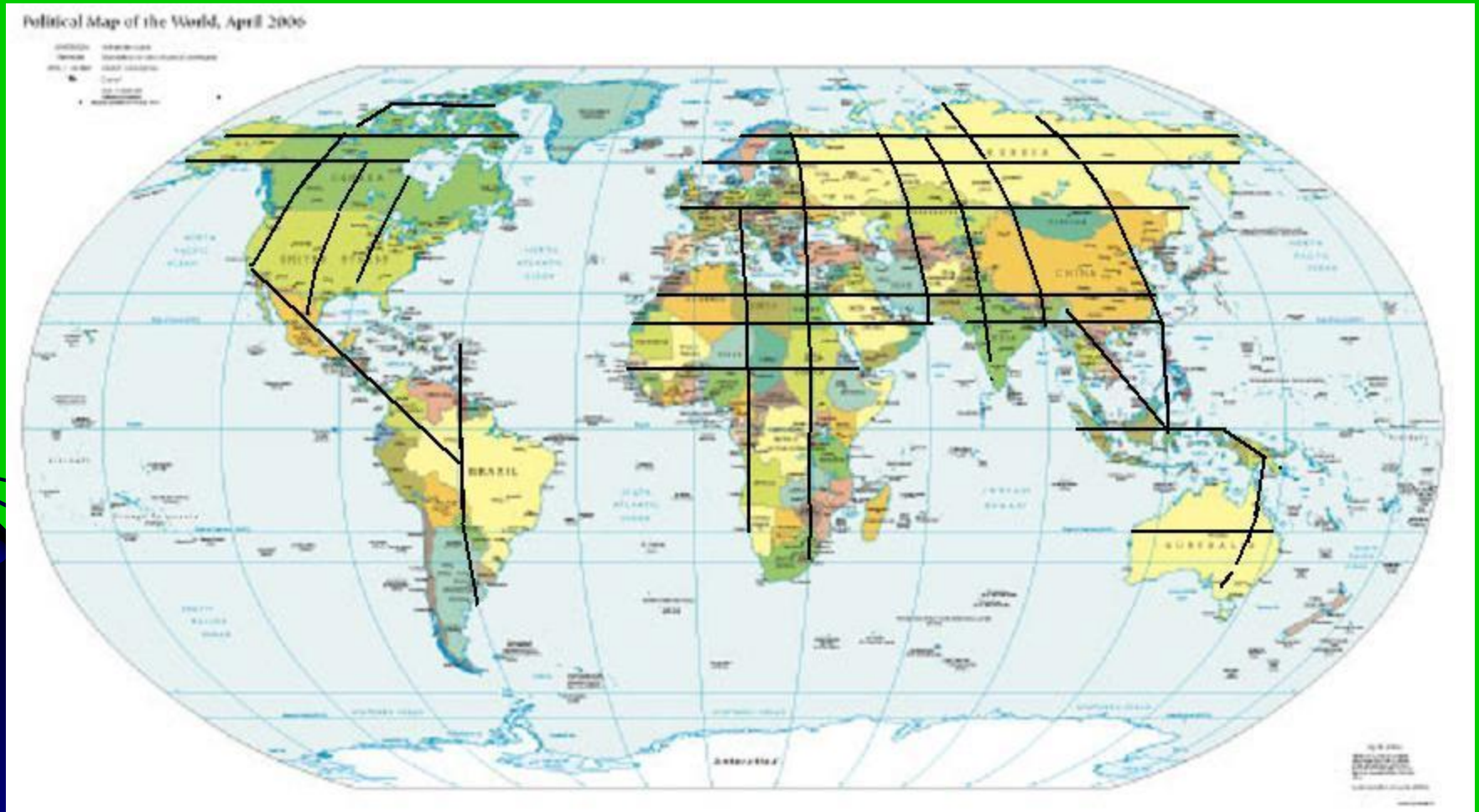
National Renewable Energy Grid



National Renewable Energy Transmission Fund

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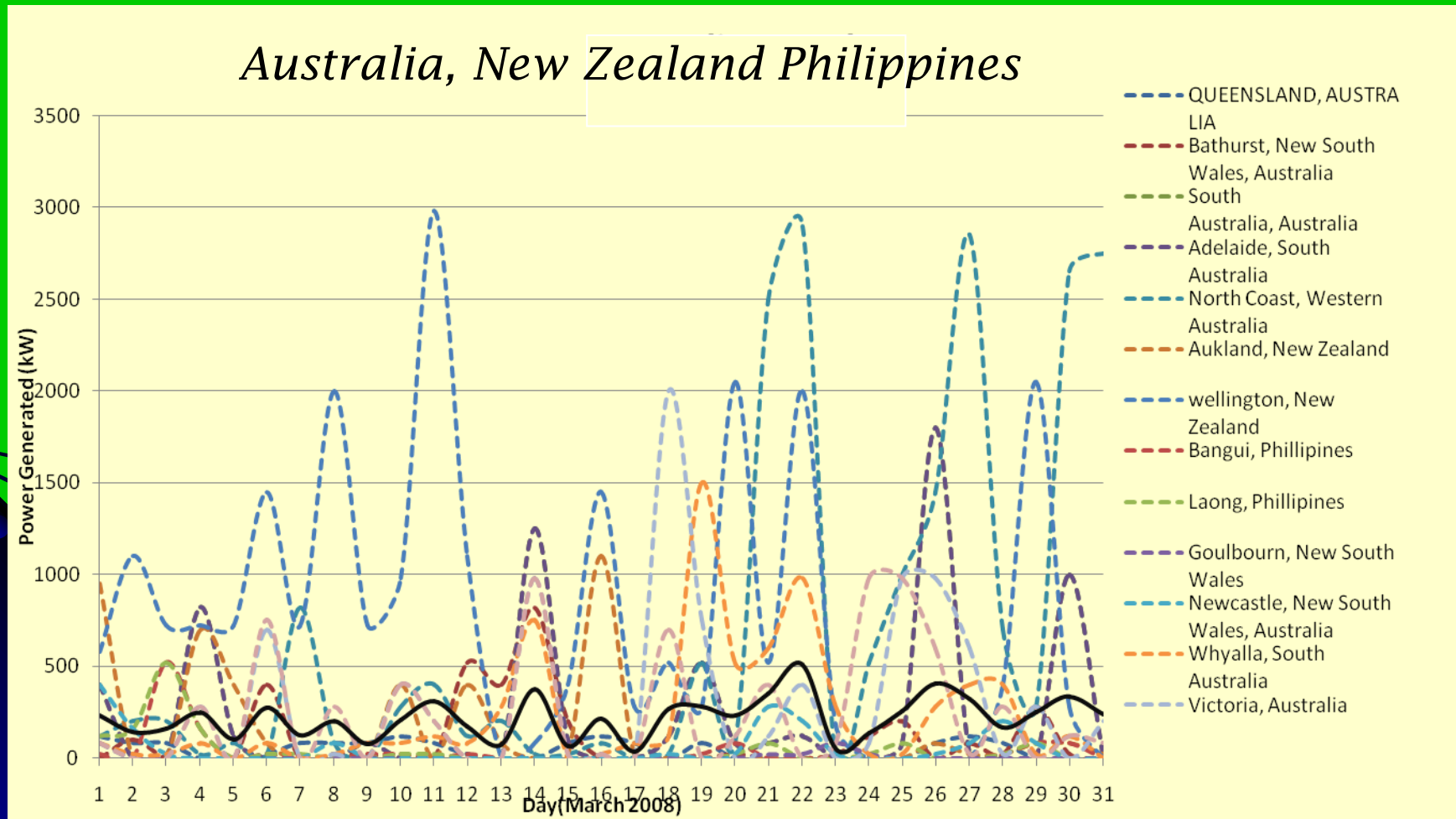
Wind data studied for six regions- March 2008

- Australia, Philippines, New Zealand - S. Martinsundaraj*
- Central Africa - A. E. Thuppale*
- India - G. Ramachandran*
- Russia - Ms. Padmavati Kasthurirangan*
- Scandinavia - D. Krishnamurthy*
- China - R. Finton*



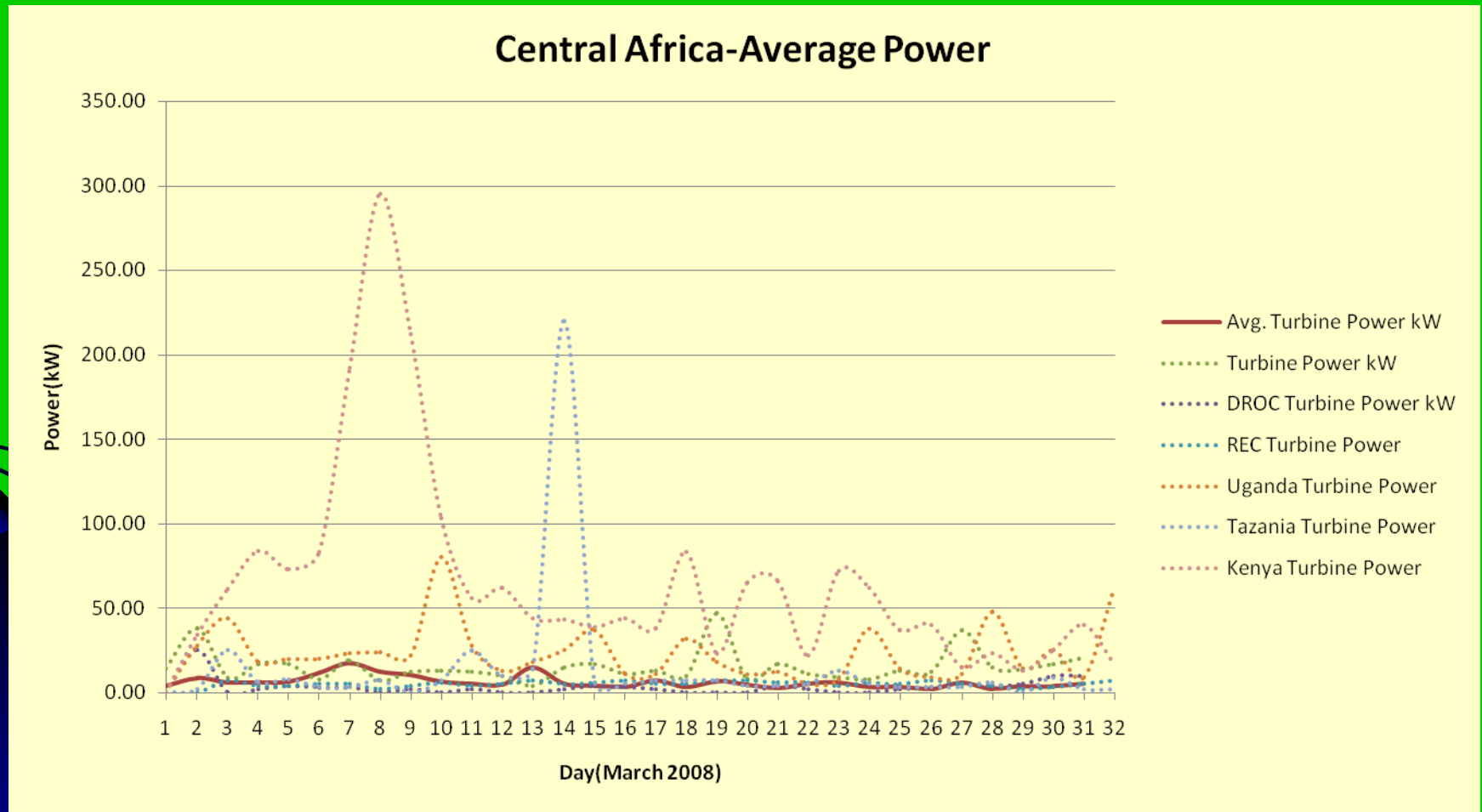
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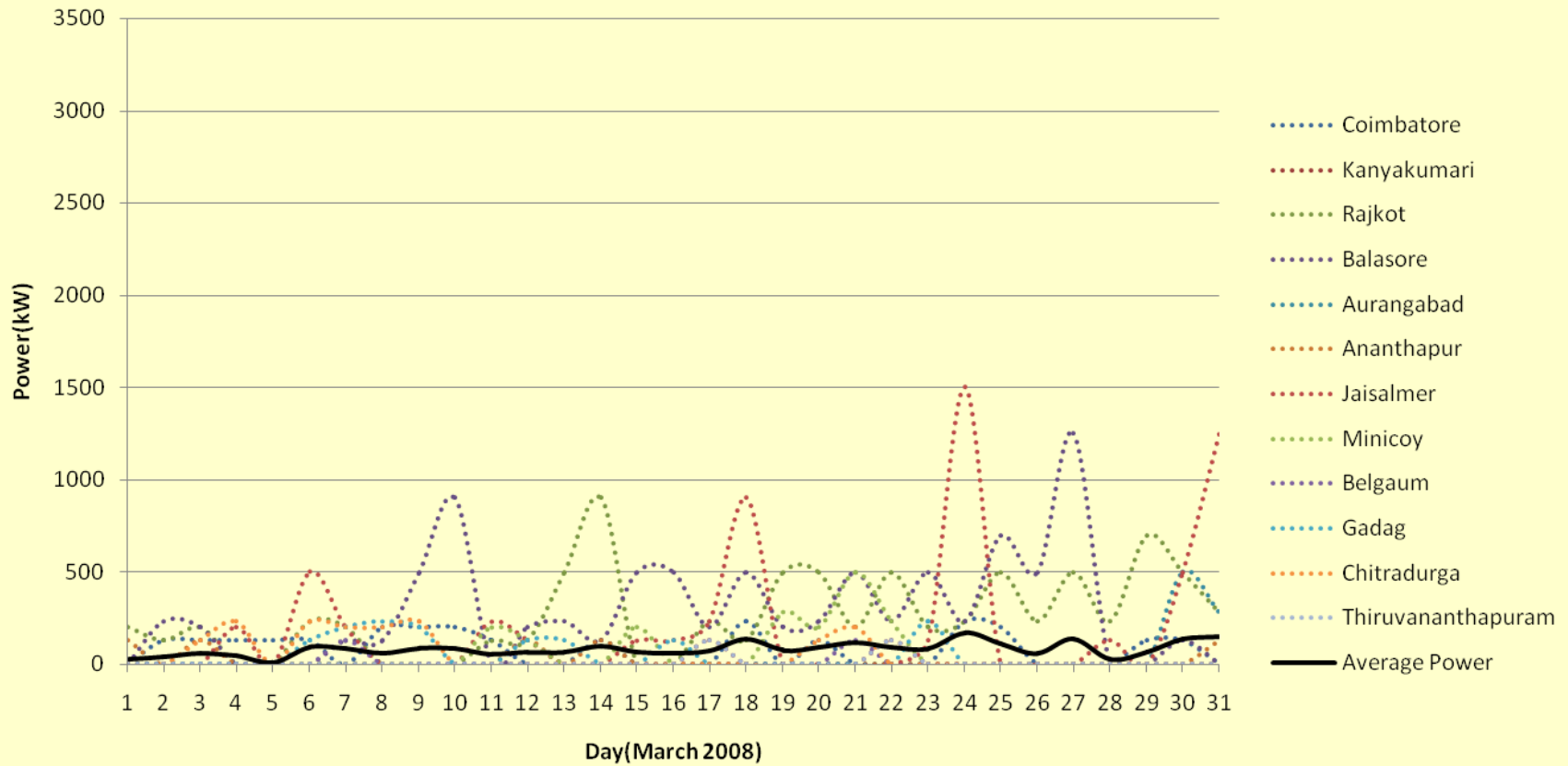
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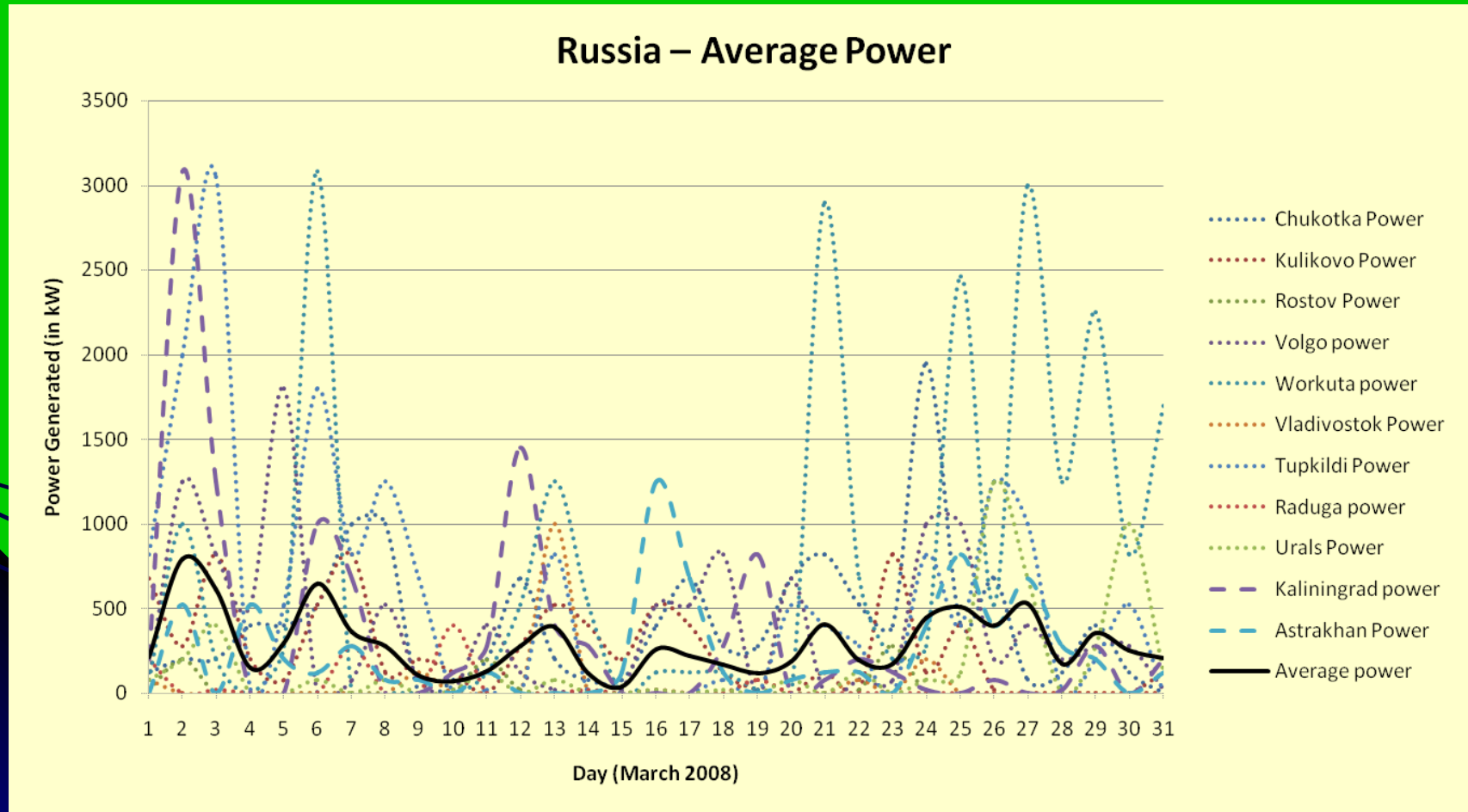
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India - Average Power



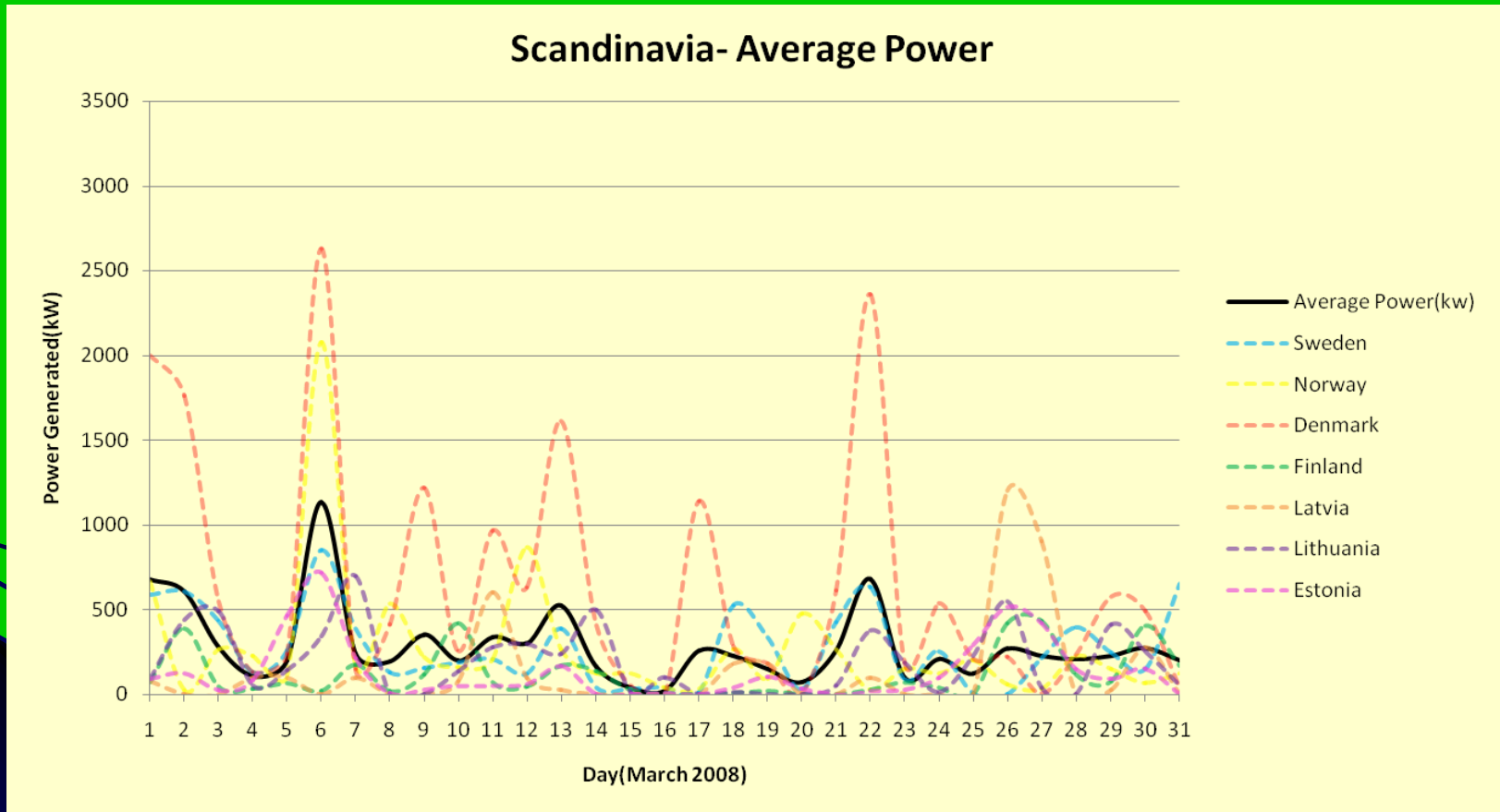
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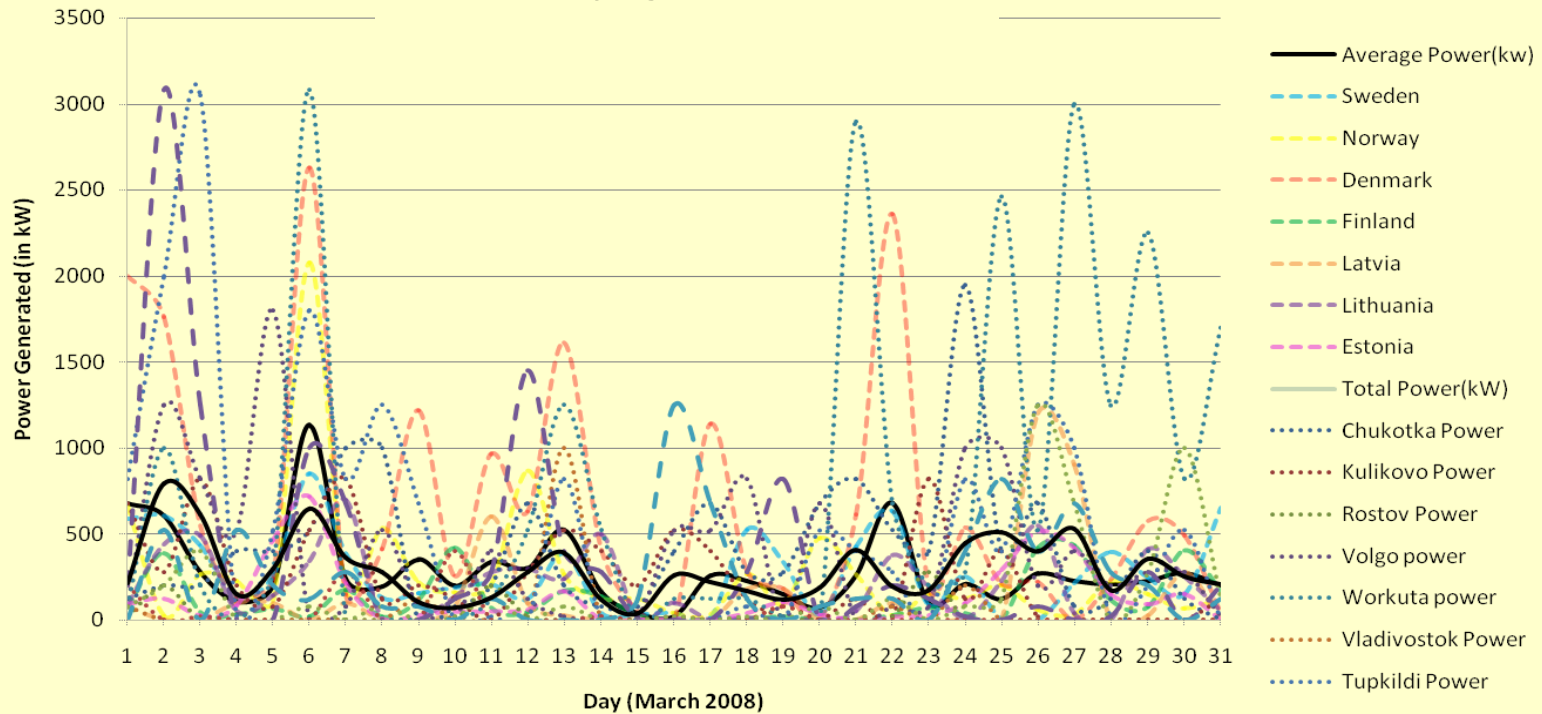
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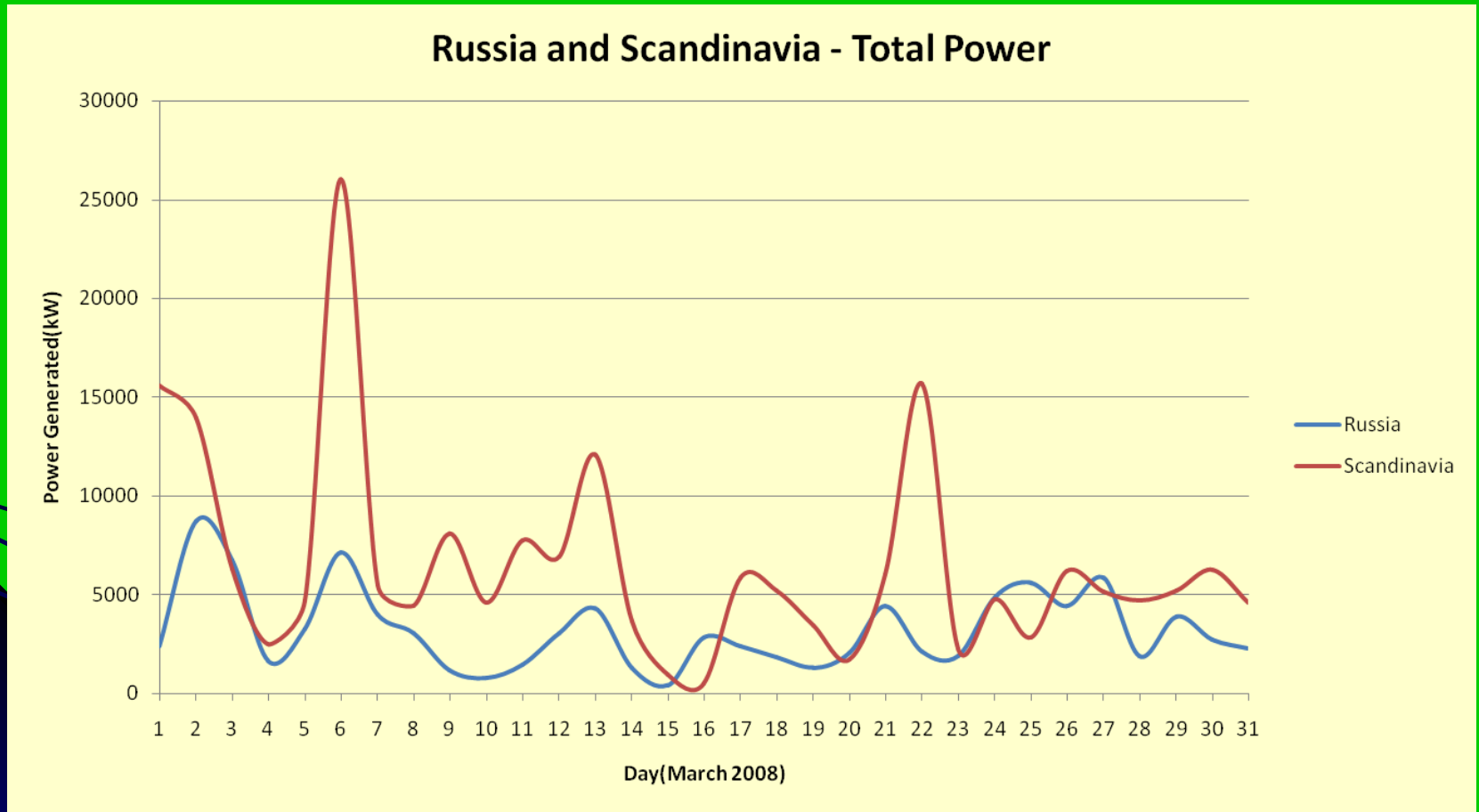
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Russia & Scandinavia



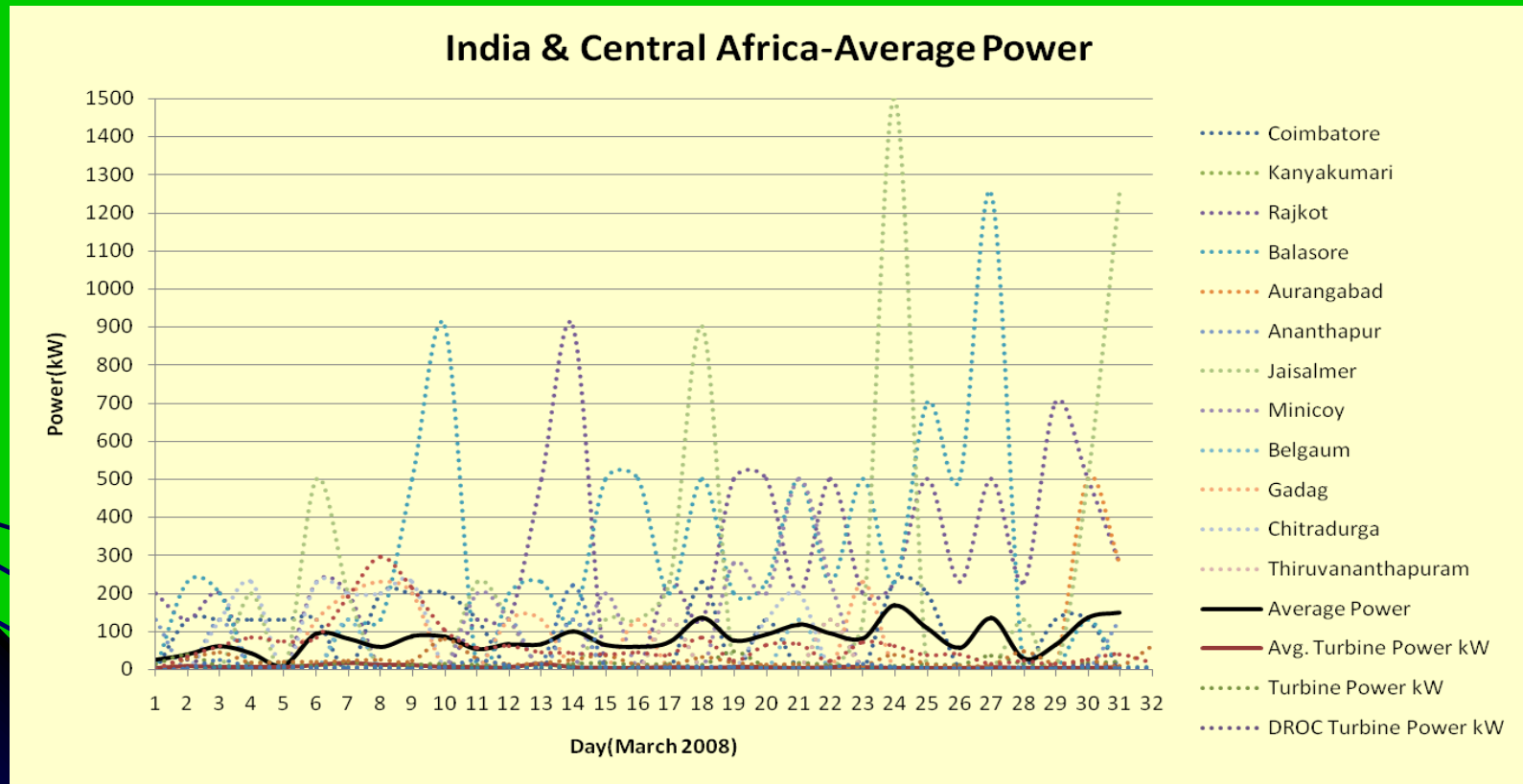
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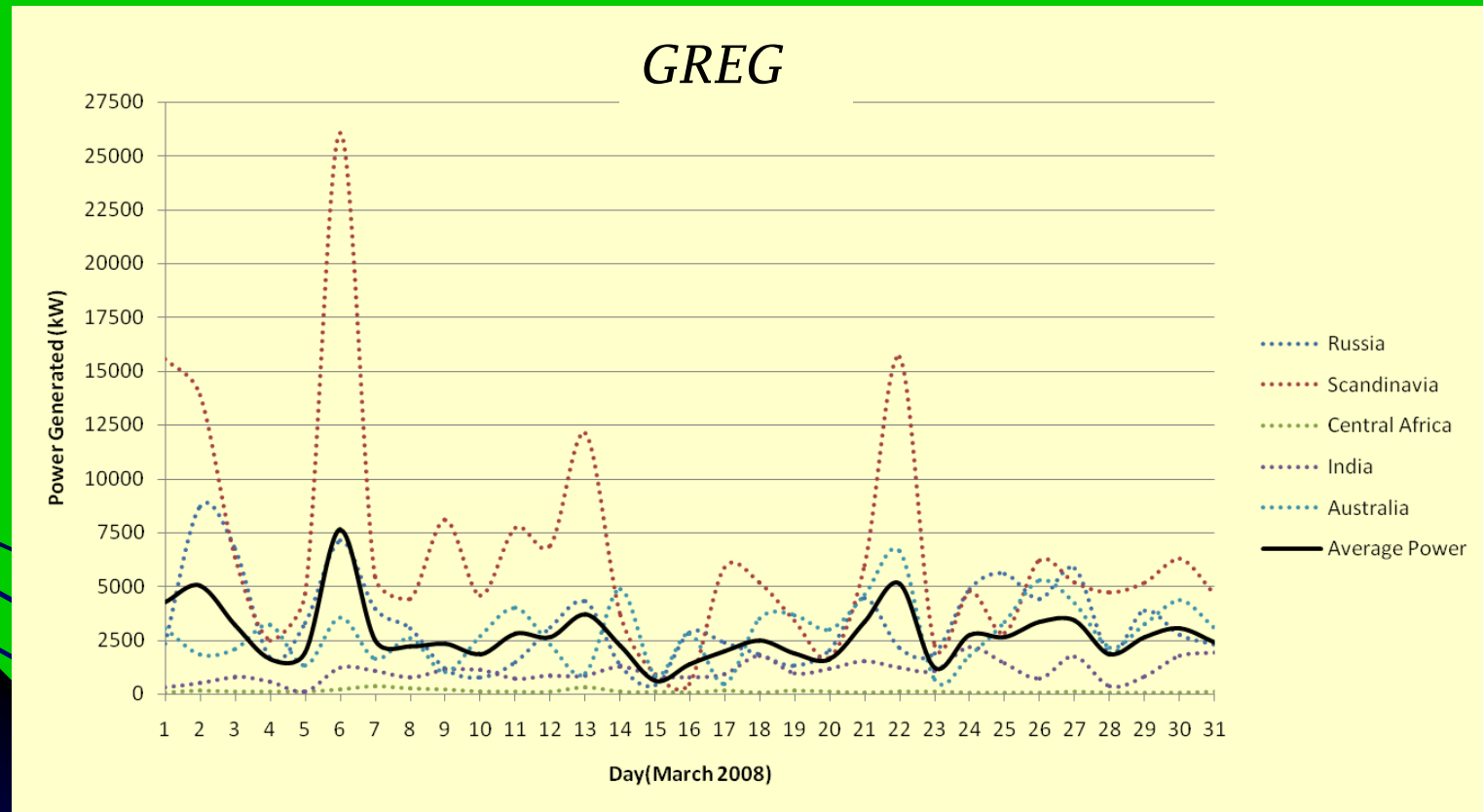
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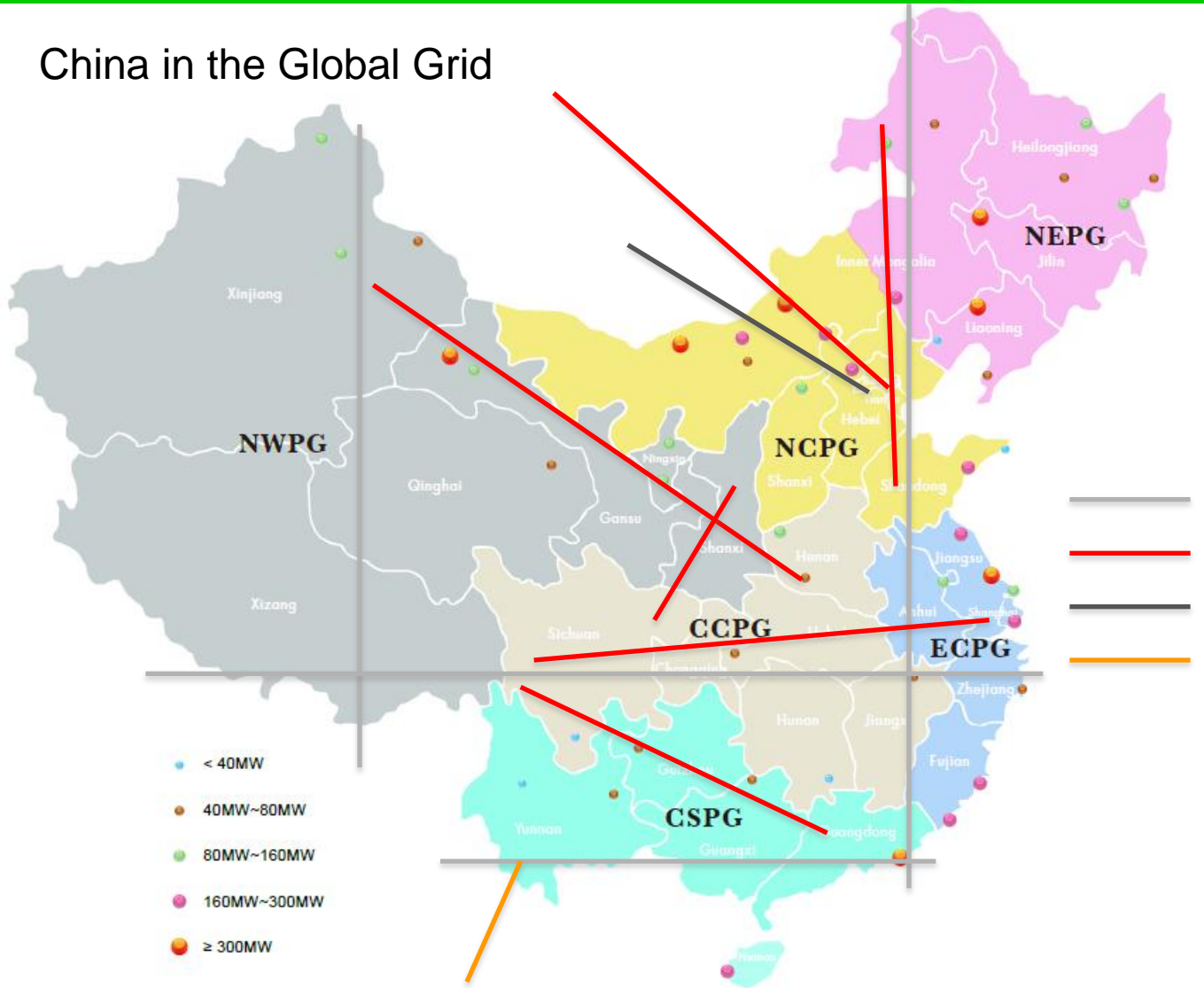
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Global Renewable Energy Grid

China in the Global Grid



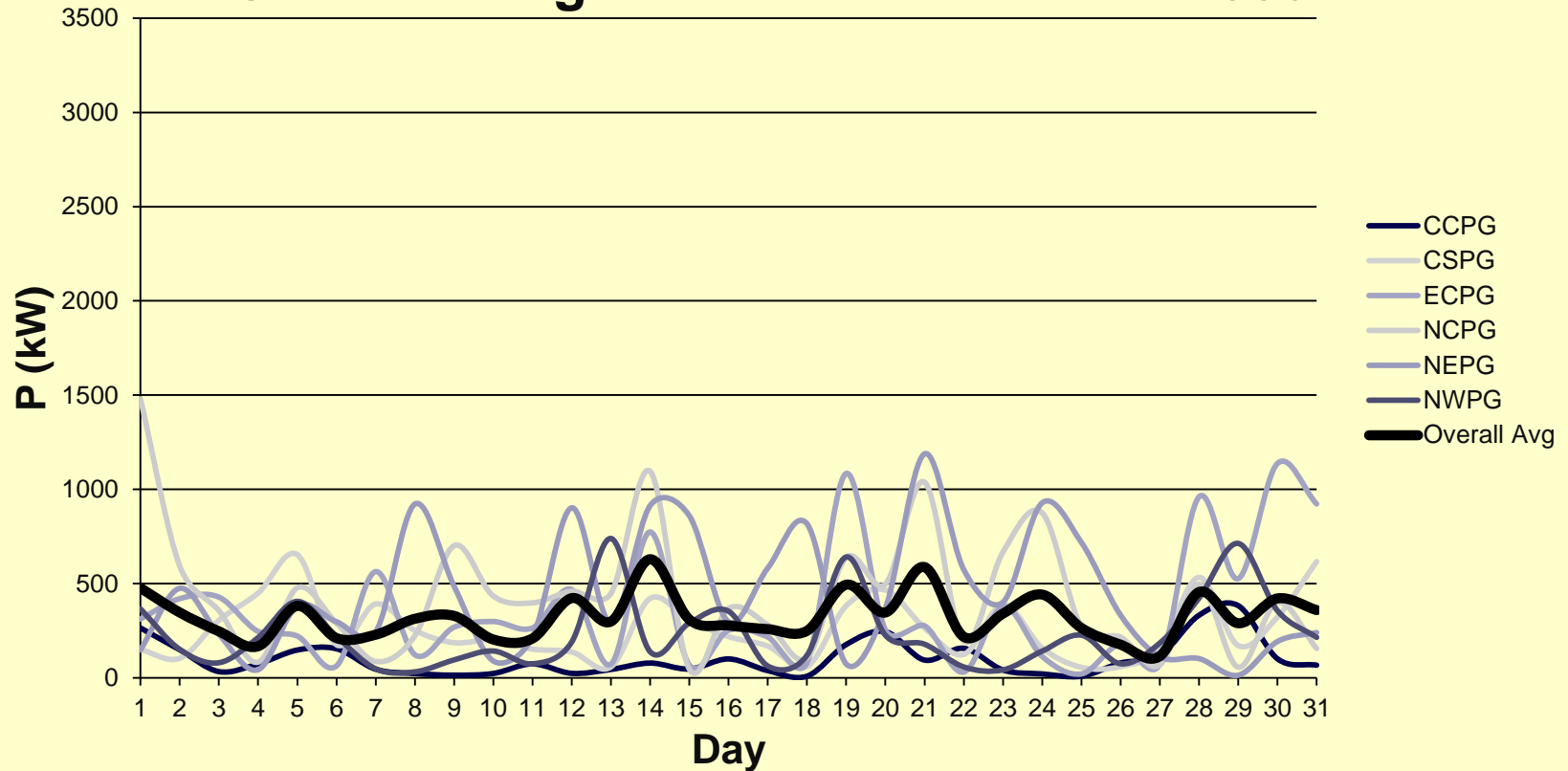
GREG 800kV DC
 China 800kV DC
 China 660kV DC
 China 500kV DC



The Vision

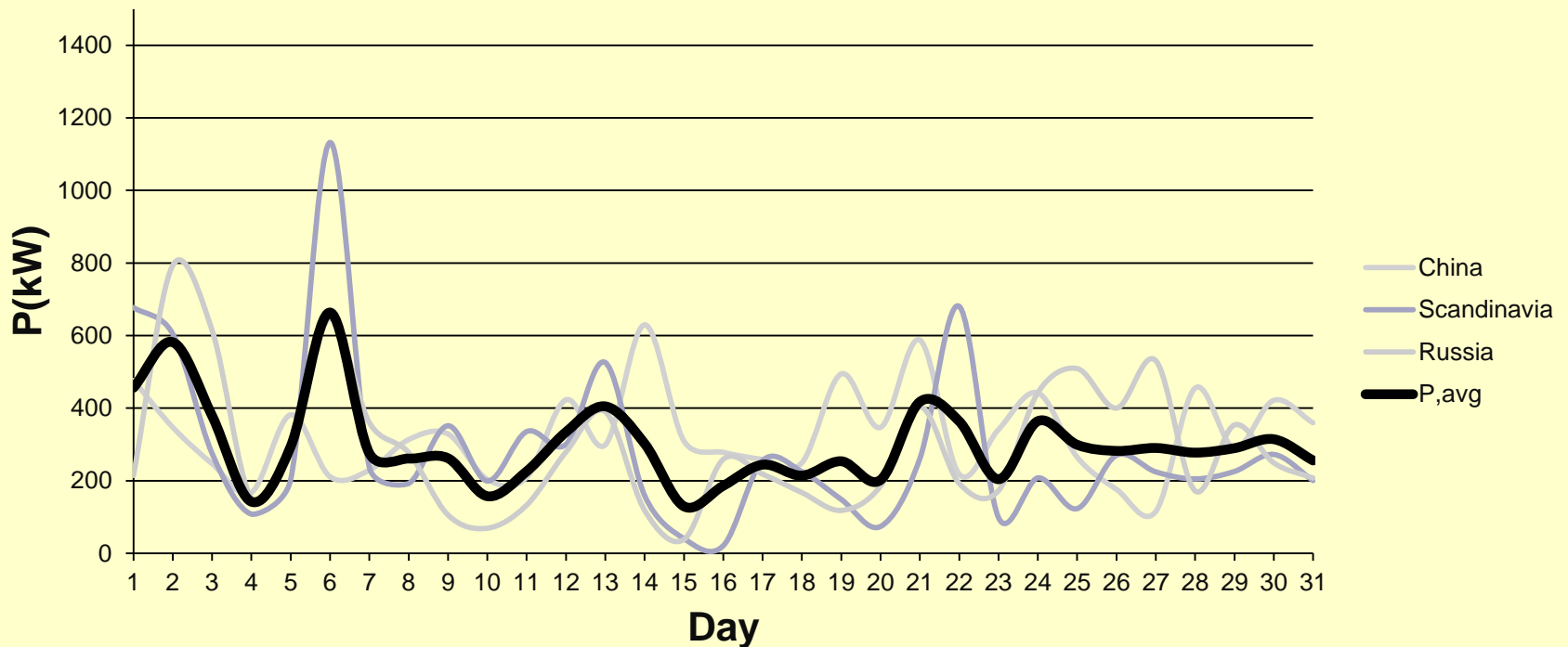
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China Average Wind Power - March 2008



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Northern Hemisphere Wind Power: China, Scandinavia, Russia

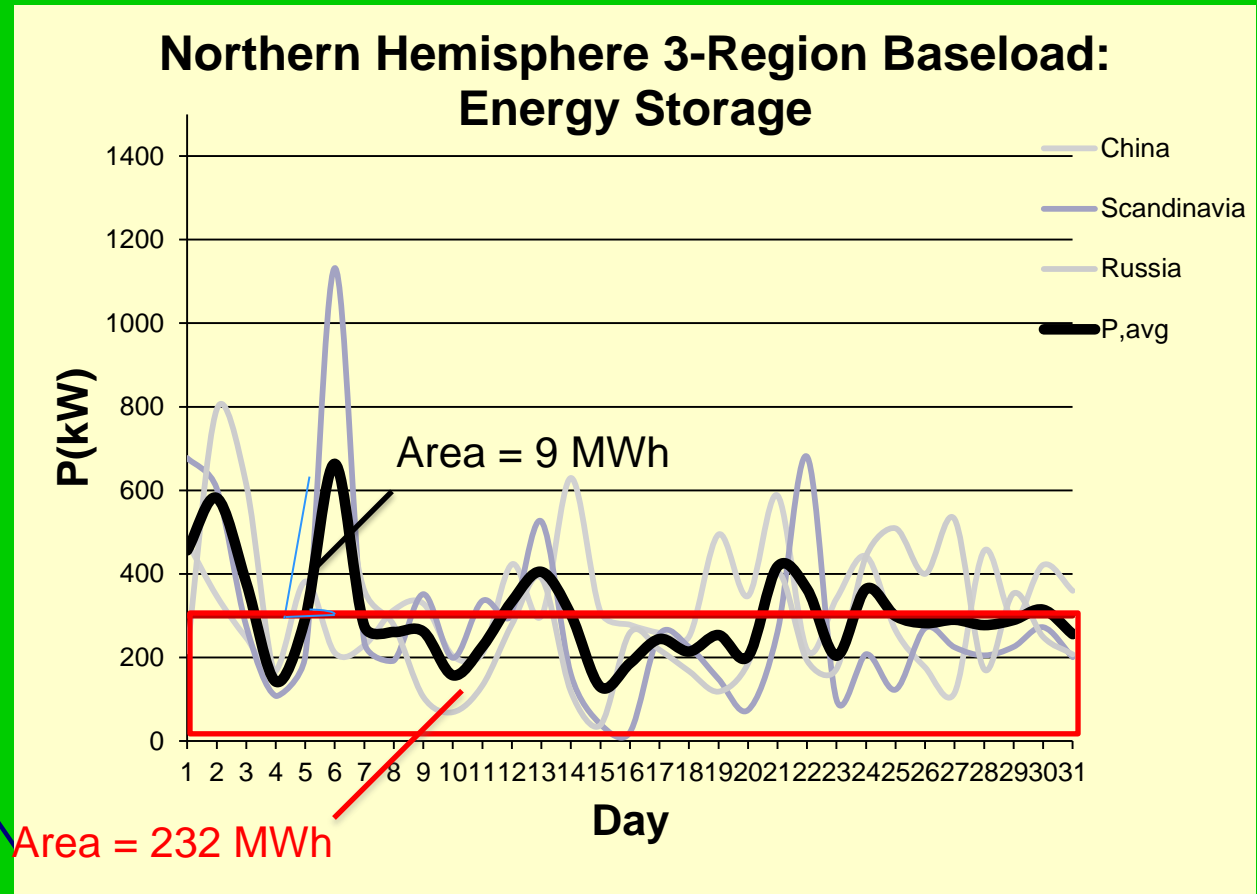


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- Highest Peak:
March 6
- Storage requirement
= 3.9%



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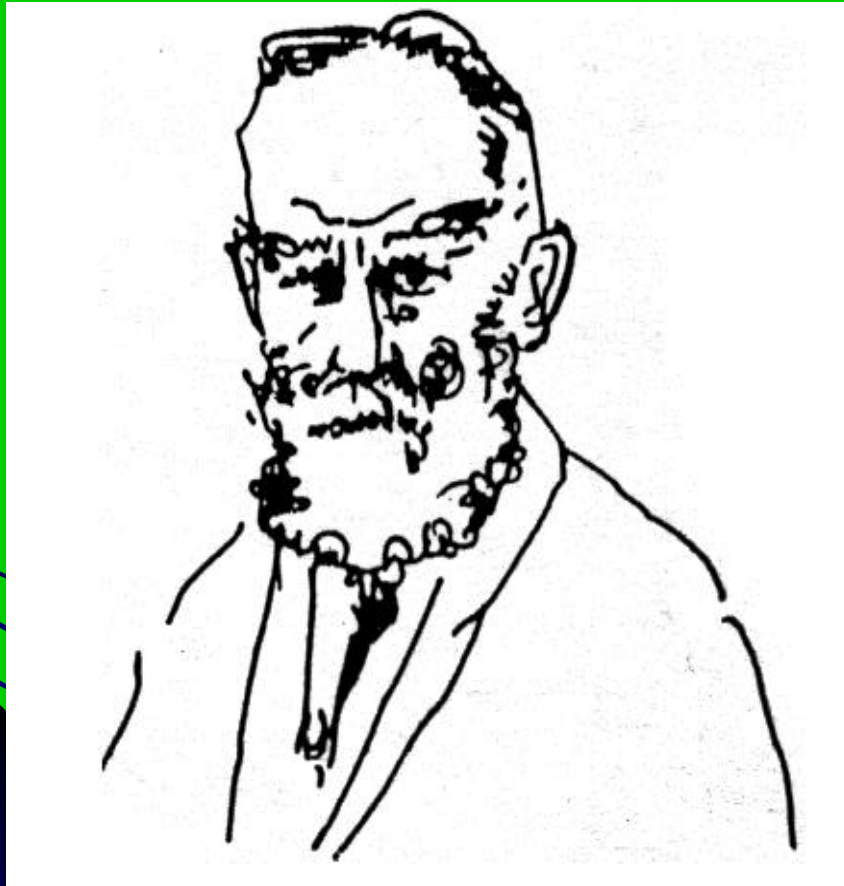
The Blueprint:

- 1. United Nations General Assembly to set up a “United Nations Renewable Energy Organization” – UNREO*
- 2. UNREO to develop 800 KvDC power transmission grid along lines of Longitude and lines of Latitude for connection of major wind and solar power plants of participating nations.*
- 3. UNREO to authorize International Energy Agency [IEA] to set up an ISO [Independent Systems Operator] responsible for transmission and trading of renewable power between the participating countries.*
- 4. Participating countries to set up their own ISOs responsible for transmission and trading of renewable power within their respective boundaries.*



Integration of Wind Power

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*You see things, and say,
“Why?”*

*But I dream of things
that never were,
and say, “Why not?”*

*George Bernard Shaw
Back to Methuselah [circa 1921]*

