The Visualization of Asian Renewables Energy Evolution

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Overview

Renewable energy grows much faster than any other energy in recent years.   According to the renewables market report (IEA, 2017), the renewable energy shows new records every year in last six years. And, two-thirds of all global net electricity capacity growth in 2016 is from the renewable energy.   IEA attributes the above achievement to three factors: strong government policy support, technology improvement, and the arrival of giant emerging economies spurred steps change economies of scale.   Although some experts believe the renewable energy will continue to grow fast, the others have opposite view since some countries already revised the favorable policies (e.g. the revision of Feed in Tariff strategy) due to the cut of Government's compensation budget, and less suitable site can be found for new renewable energy installation.   Rather than the slower growth in EU and North American recently, Asia has rapid growth in the renewable energy.   It is worthy for us to investigate the renewable development in Asia area.

The purpose of this paper is to reveal the evolution of Asian renewable energy development by applying the visualization techniques.   We will draw many visualization figures to capture the movement of different renewable energy in different countries.   We believe some snag shots of the renewable energy evolution would help us to better capture the possible trend of Asian renewable energy.

Methods

After reviewing all related articles, we tackle this issue step by step as below:
1. Collect renewable energy data from IRENA.
2. Focus on the renewable electricity capacity and the renewable electricity generation per hour.
3. Draw all renewable energy trend figures for top 10 countries in Asia.
4. Calculate the yearly electricity capacity factor for each renewable energy for top 10 countries (e.g. Top wind power capacity installation countries)   .
5. Examine the accuracy of the data if the capacity factor is greater 1
6. Observe the movement of the capacity factors and examine the policy implementation for top 10 countries.
7. Deduce the most probably renewable trend in above top 10 countries.

Results

Using yearly renewable electricity capacity and the renewable electricity generation data from 2006 to 2015 for all above data, we follow above process to trace the movement of many capacity factors indifferent countries. Our preliminary visualization data results show that the renewable development evolution are very different in different countries.   For example, China shows very rapid growth in recent years, while Japan's catch up much quickly after the Fukushima disaster. The capacity factor also brings us a lot of findings.   We find some countries have flat capacity lines, while the line of the other countries move upside down.

Conclusions

Although the addition of world renewable capacity hit record high year and year, some data information still bring us a lot of confusions.   For example, the electricity capacity and the electricity generation inconsistency is still found even in the advanced countries (e.g. Japan).   We believe the electricity capacity factor (electricity generation per hour divided by electricity capacity) and the electricity generation are two important factor for us to discover if we would like to reveal the development of renewable energy in Asia.

References

[1]IEA, Renewables 2017: Analysis and Forecasts to 2022.

[2]Nilsson, Anders, Pia Stoll, Nils Brandt, "Assessing the impact of real-time price visualization on residential electricity consumption, costs, and carbon emissions", Resources, Conservation and Recycling, Volume 124, September 2017, Pages 152-161

[3]Schuh, M.A., J.M. Banda,T. Wylie,P. McInerney,K. Ganesan Pillai,R.A. Angryk, "On visualization techniques for solar data mining", Astronomy and Computing, Volume 10, April 2015, Pages 32-42

[4]Squalli Jay, "Renewable energy, coal as a baseload power source, and greenhouse gas emissions: Evidence from U.S. state-level data", Energy, Volume 127, 15 May 2017, Pages 479-488

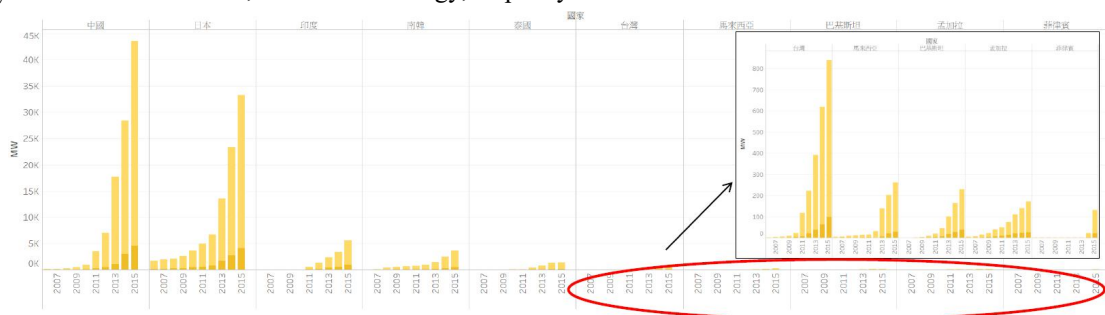**Keywords:**Visualization, Renewable Energy, Capacity Factor

Figure 1: The Evolution of Solar Energy of Top Ten Countries in Asia.