# Renewable Energy Development and Carbon Emission Reduction in Finland

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## Motivation

As a graduate student, one of the very first things after arrived in Finland is to sign the electricity contract for the rented student apartment. In reviewing various electricity contracts, I noticed that the source of energy—such as hydro, wind, or coal—was specified. Typically, contracts featuring sustainable energy sources were priced higher. This observation sparked my curiosity about the real economic impact of different energy types and their broader implications for both individuals and society. To gain a deeper understanding, I have decided to analyze Finland's progress in renewable energy development and its impact on carbon emission reduction or perhaps the economy if data is sufficient. This investigation will provide insights into the economic and environmental consequences of energy choices, benefiting both individual decision-making and broader societal understanding.

## Early Methods

1. **Data Collection**: Mainly from some authority both of Finland or the EU, such as Eurostat, International Energy Agency (IEA), and Energy Authority Finland. From which, it is possible to
   gather comprehensive statistics on renewable energy production and consumption, including wind, solar, and biomass sources. Then utilize data to compare Finland's renewable energy use and carbon emissions with other EU countries.
2. **Data Processing and Analysis**:
   - **Data Cleaning and Preprocessing**: Ensure data accuracy and consistency through rigorous cleaning and preprocessing.
   - **Analytical Tools**: Use Python tools such as Pandas and Matplotlib to perform in-depth analysis of trends in renewable energy use and carbon emissions in Finland. If the data is not large-scale, Tableau will be used as well.
   - **Statistical Analysis**: Time series and regression analysis will be applied to evaluate the impact of renewable energy growth on carbon emissions reduction and to explore potential causal relationships.
3. **Visualization Design**:

- **Trend Analysis**: Develop charts to illustrate the growth of renewable energy sources, such as wind and solar power, over the past decade.
- **Emission Impact**: Create visualizations to show how increased renewable energy usage has influenced Finland's carbon emission levels and assess the effectiveness of emission reduction efforts.
- **World map**: To compare Finland with other countries, if data is sufficient. Also, some other comparative charts may be designed to contrast Finland's renewable energy data with other European countries, highlighting both achievements and challenges.

**(Probably as a bonus) How to select your electricity contract**:

- **Data Crawling**: Crawl down all types of electricity contract in Finland. Also, analyze and combine the data piece together as a whole.
- **Data Visualization**: Develop visualizations to illustrate how different types of contracts—particularly those involving renewable energy—affect pricing and highlight the trade-offs between cost and sustainability.

## Expected Results

- **Insights**: The analysis and visualization are expected to clearly demonstrate Finland's advancements in renewable energy and its specific effects on carbon emissions reduction. This will enhance understanding of the role renewable energy policies play in meeting emission targets and provide valuable information for individuals and policymakers.
- **Comparative Analysis**: By comparing Finland with other European countries, the project will reveal Finland's relative strengths and weaknesses in renewable energy development. This comparative approach will offer empirical evidence for other countries to formulate effective policies and foster international collaboration.
- **Electricity Contract Recommendations**: The findings will offer insights into how different types of electricity contracts affect pricing and sustainability, providing practical guidance for individuals in selecting energy sources.

This project aims to leverage detailed data visualization to showcase Finland's achievements in renewable energy and offer valuable support for family energy decisions and environmental policies, contributing to broader climate action and sustainable development goals in UN SDGs
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