



# Designing electricity markets in the presence of renewables and elastic demand

Mario Blázquez (Postdoc, Department of Industrial Economics and Technology (NTNU))

## Challenge and objectives

I develop economic models to increase competition and reliability in electricity markets by:

- Designing better electricity markets
- Increasing flexibility in the production, transportation and supply

## Research tasks

- Develop economic models to improve the design of electricity markets
- By using those economic models, develop better operation research models that introduce economic principles

## Approach

To improve the design and reliability of electricity markets I use three different approaches that complement each other:

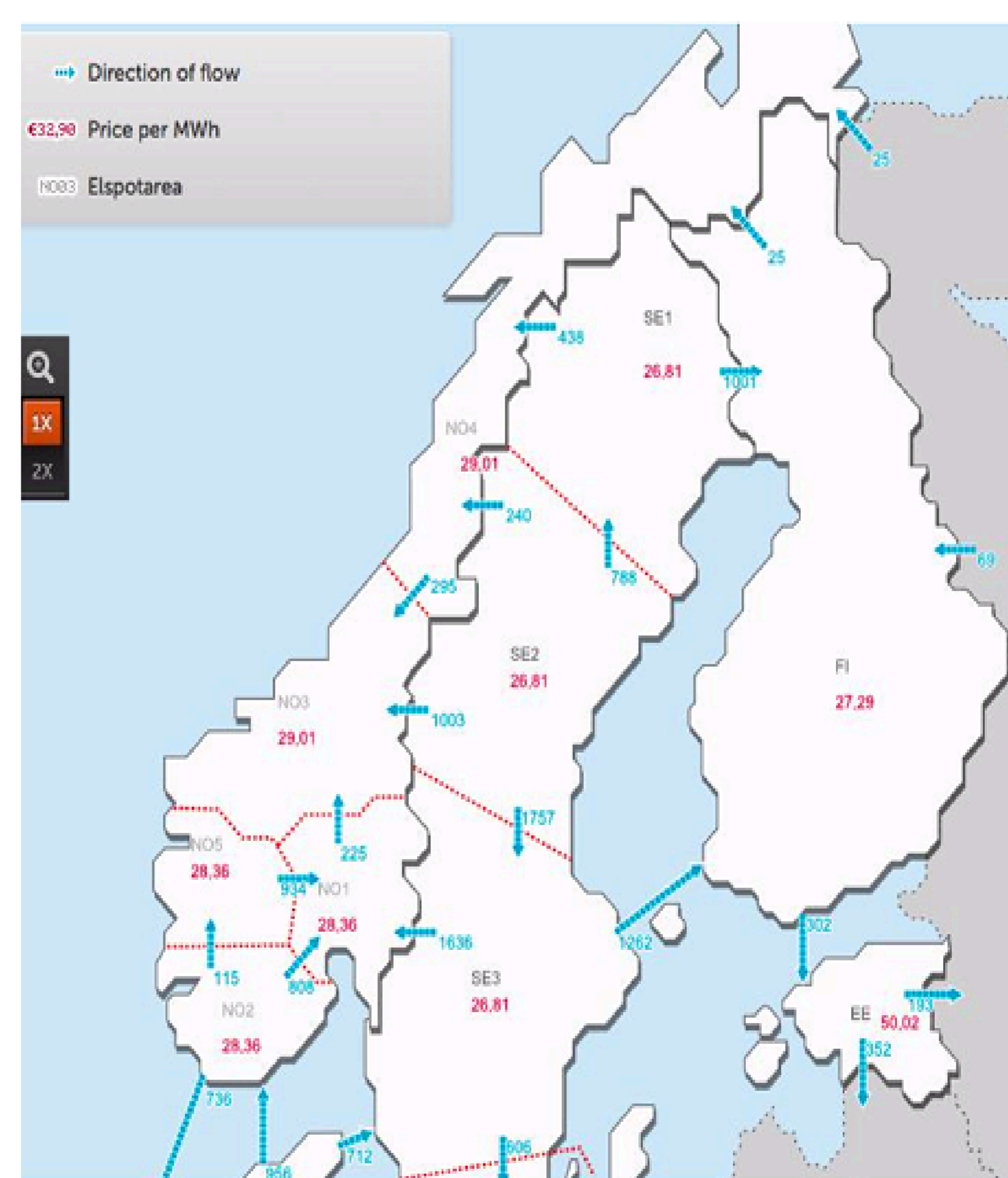
- Theoretical economic models
- Operation research models
- Economic experiments

## Significant results

I have finished three papers that are now under review in the International Journal of Industrial Economics, Energy Economics, and Energy Policy:

- Paper 1: In the presence of transmission constraints and transmission tariffs, the discriminatory price auction outperforms the uniform price auction by increasing consumers' welfare and transmission efficiency
- Paper 2: An investment in transmission capacity outperforms an investment in production capacity by increasing consumers' welfare. I also identify the economic forces that determine the result and I prove when those forces operate simultaneously or independently
- Paper 3: I develop a model of imperfect competition to characterize the equilibrium in zonal markets. I prove that consumers' welfare and investment efficiency can be improved by changing the redispatch mechanism implemented by the auctioneer

## Illustration



We can increase **competition** and **reliability** in the electricity markets by:

- Improving the **design of electricity markets**
- Increasing **flexibility** in the transmission, the production and the demand

Figure: Nordpool