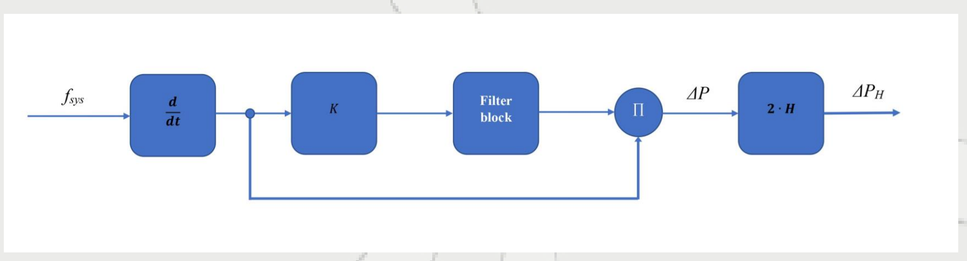
The story of stability with wind power

The great thing about green and renewable energy sources, such as wind and solar power, is that they are super environmentally friendly and their large expansion into society is most welcome. In every power system, there is a balance between produced and consumed electricity. The electricity needs to be produced at almost the same time as it is consumed. If there would be a lowered production or increased consumption, this could cause instability in the electrical grid. This project focuses on how wind power turbines can help maintain stability and balance in the power system in case of large disturbances.

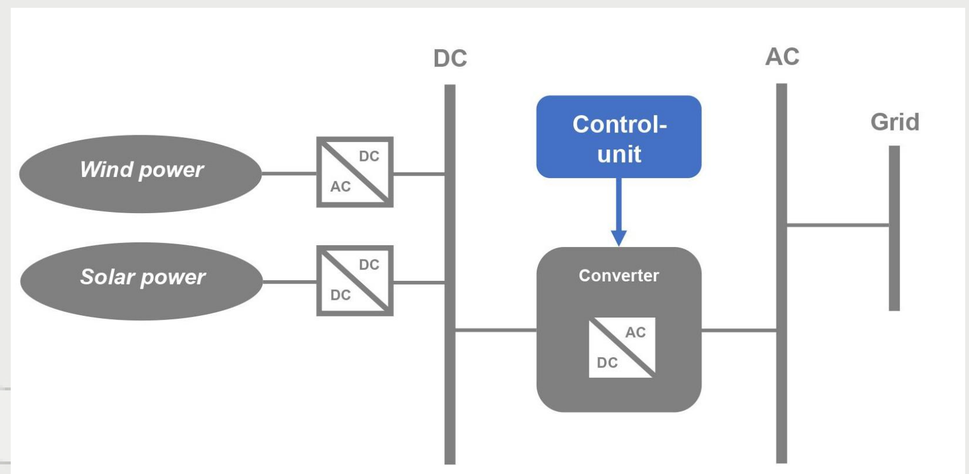
Method

- Simulation model was created in DIgSILENT PowerFactory©.
- Two scenarios:
  - Increased the use of electricity by 25%.
  - Loss of electricity production in the system.



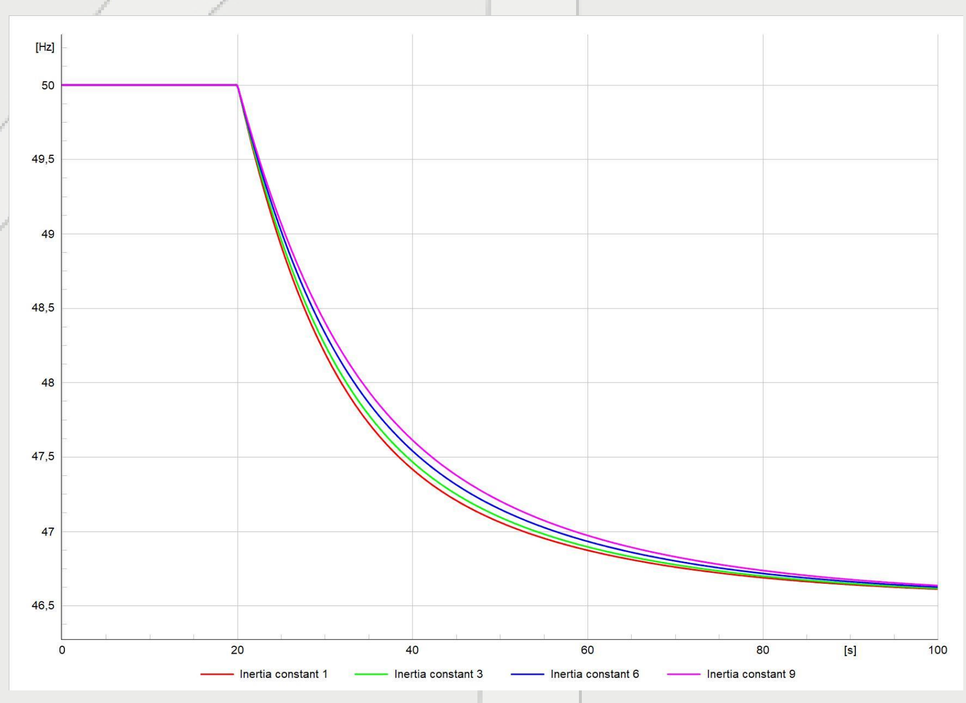
Solution

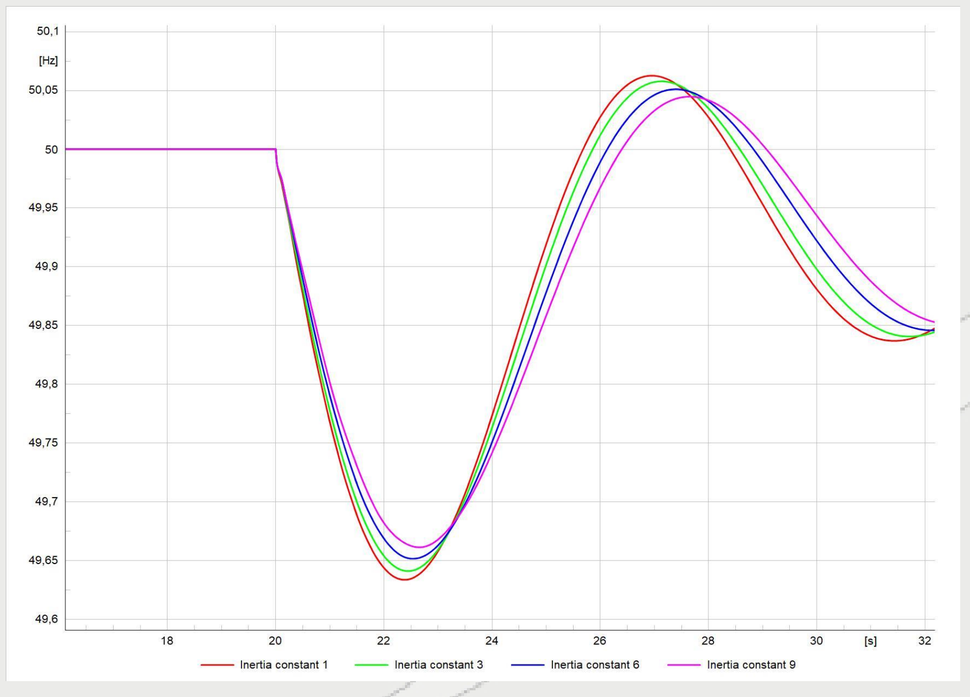
- Frequency recovery using synthetic inertia.
- Inertia controllers.
- Electronic converters.



Results

With more inertia from wind power there is a smoothening of the curves when the simulation encountered the different scenarios. The purple line shoes a higher inertia value.





Discussion

- Synthetic inertia from wind power increases stability in the power system.
- Future of renewable power production is more of a possibility than a challenge.
- Wind farms in Sweden have started taking advantage of this technology.

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