

**The role of Green certificates in achieving national targets for CO<sub>2</sub>-reduction ?**

**or**

**The interactions of three markets:  
The liberalised power market ,  
the tradable green certificate market and the  
tradable permits market**

By

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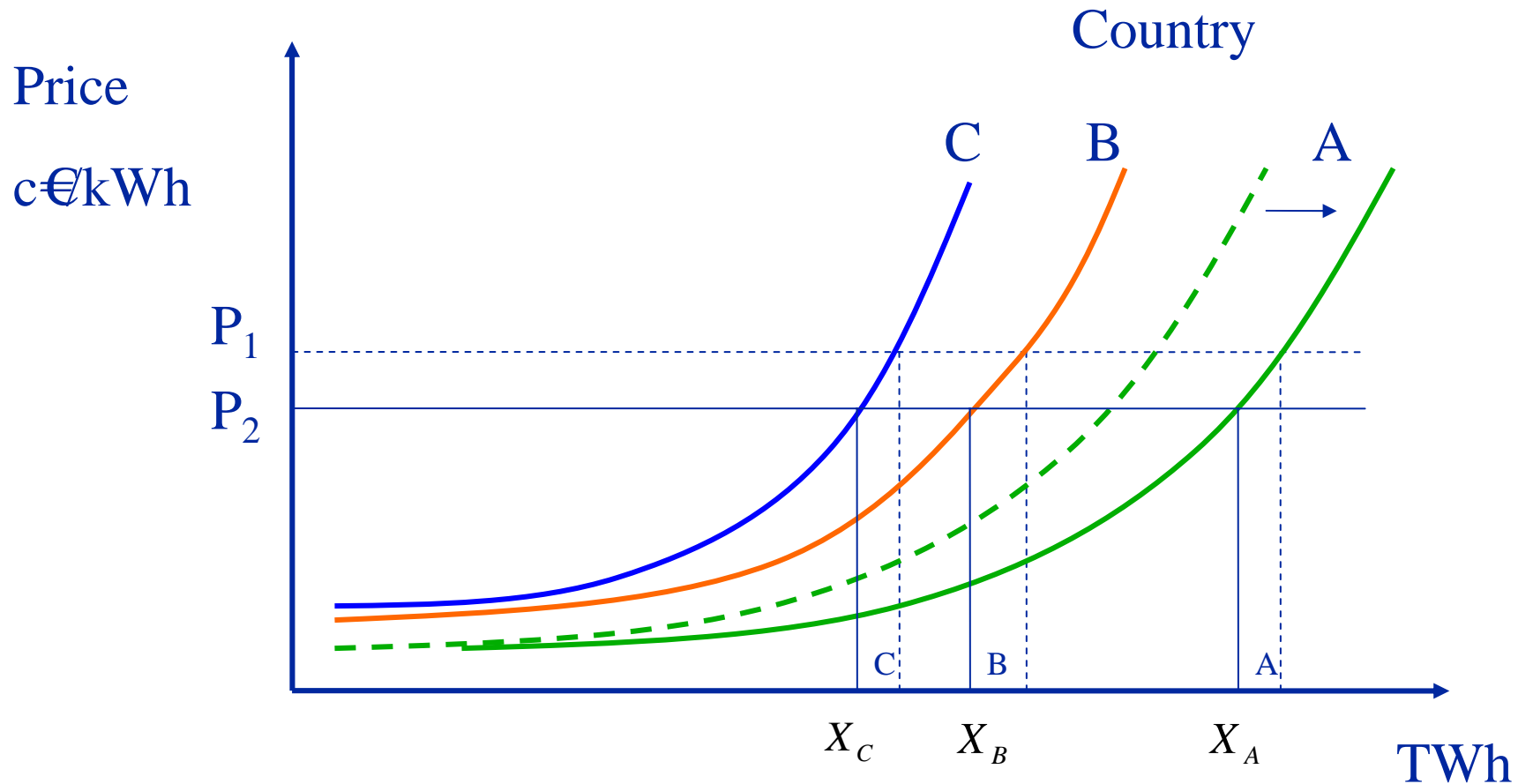
Denmark

## Overall conclusion

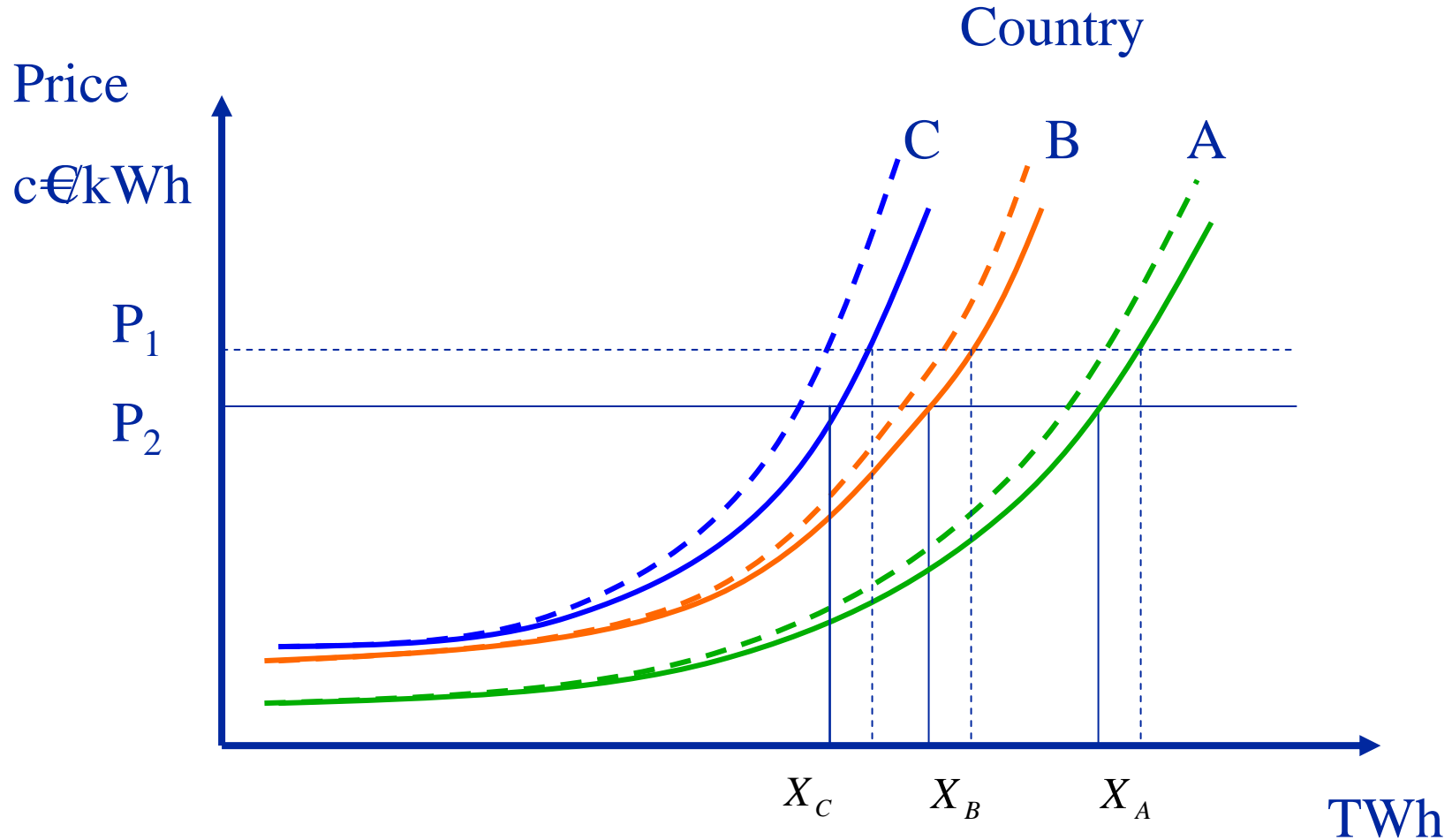
National reduction targets for GHG-emissions do not go together with a liberalised power market

- EU bubble - no problems!!
- Cancel the liberalisation of the power markets - no international power trade

# Consequences at the spot market of an increased production of renewable power in country A



# Consequences at the spot market



# A TGC-market combined with a liberalised power market

- The marginal conditions at the spot market determine which countries will reap the environmental benefits of an increased implementation of renewable energy technologies
- Additional costs for fulfilling the national TGC-targets for renewable development without achieving any national CO<sub>2</sub>-reductions

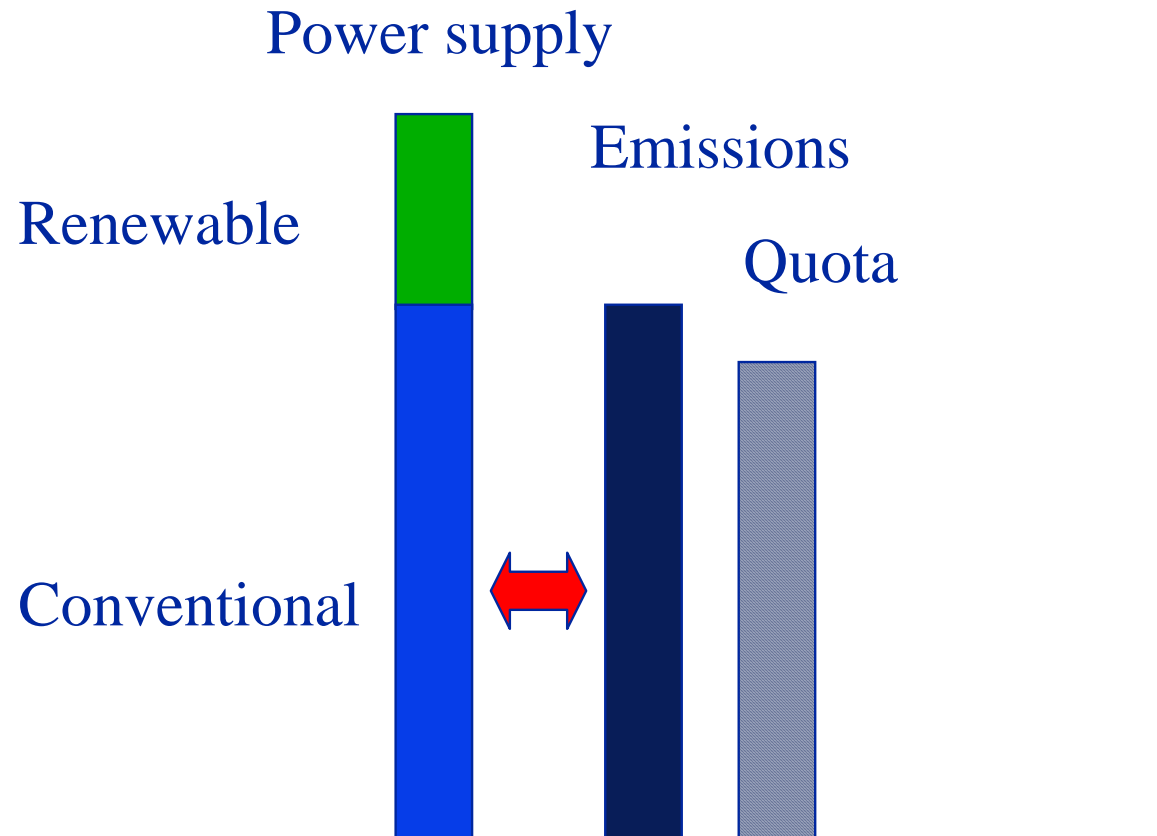
Establishing only an international TGC-market combined with a liberalised power market cannot be recommended

# A tradable permits market

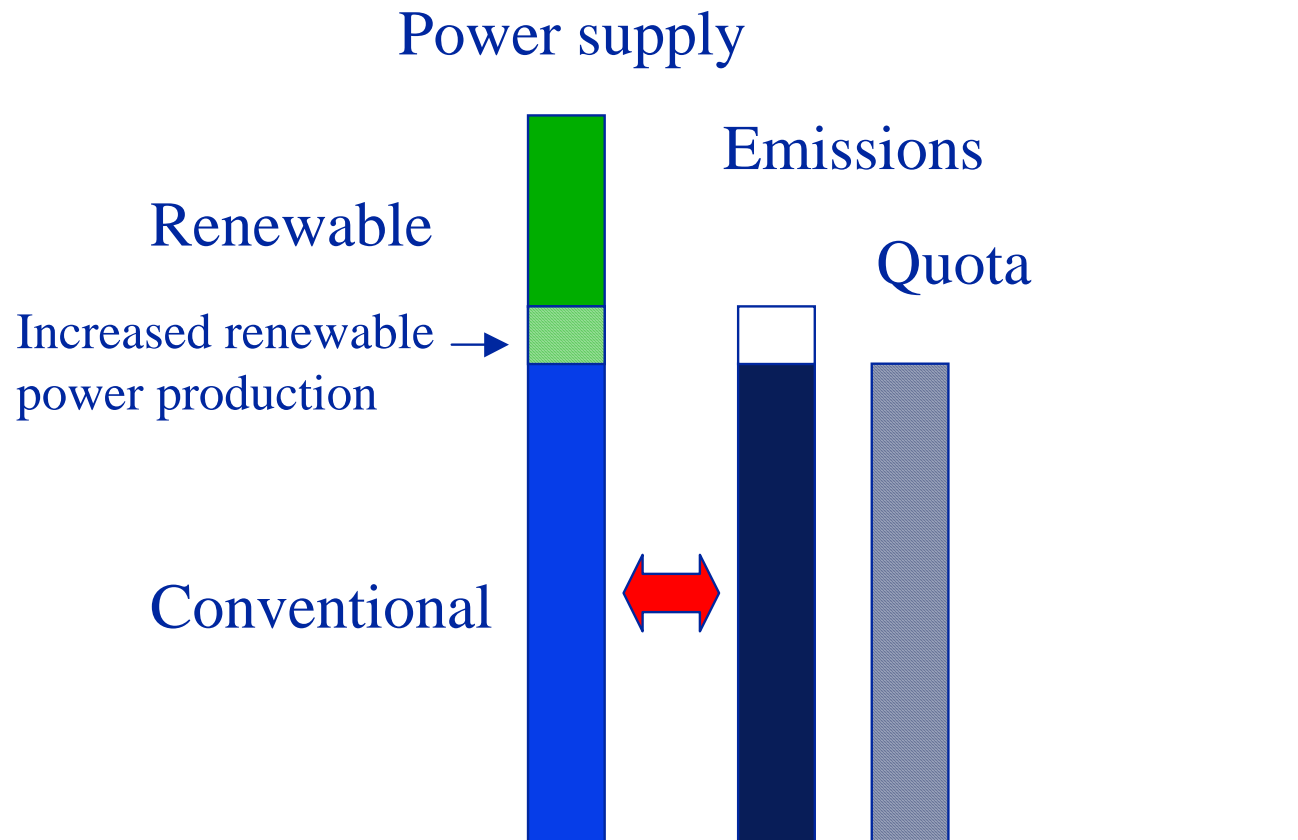
The idea is to achieve reductions in CO<sub>2</sub>-emissions from the power industry by establishing a set of national quotas (permits)

- Allows the power industry to emit a certain volume of CO<sub>2</sub>
- National and international trade in permits is possible
- Emission reductions are undertaken where they are least costly
- A penalty is paid for not complying to the quota

# The functioning of the tradable permits market

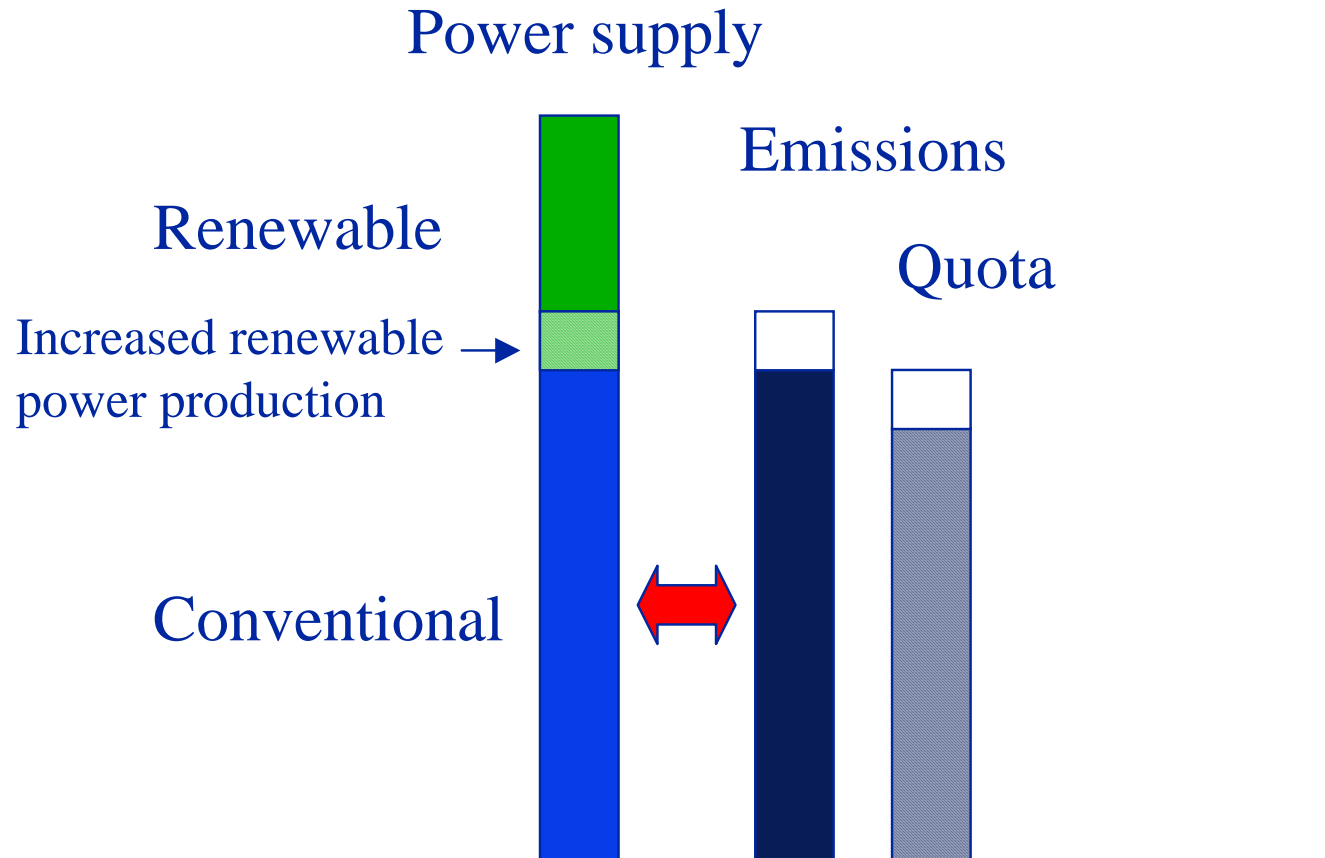


# No co-ordination of the TGC and the tradable permits market





# A co-ordinated development of the two markets



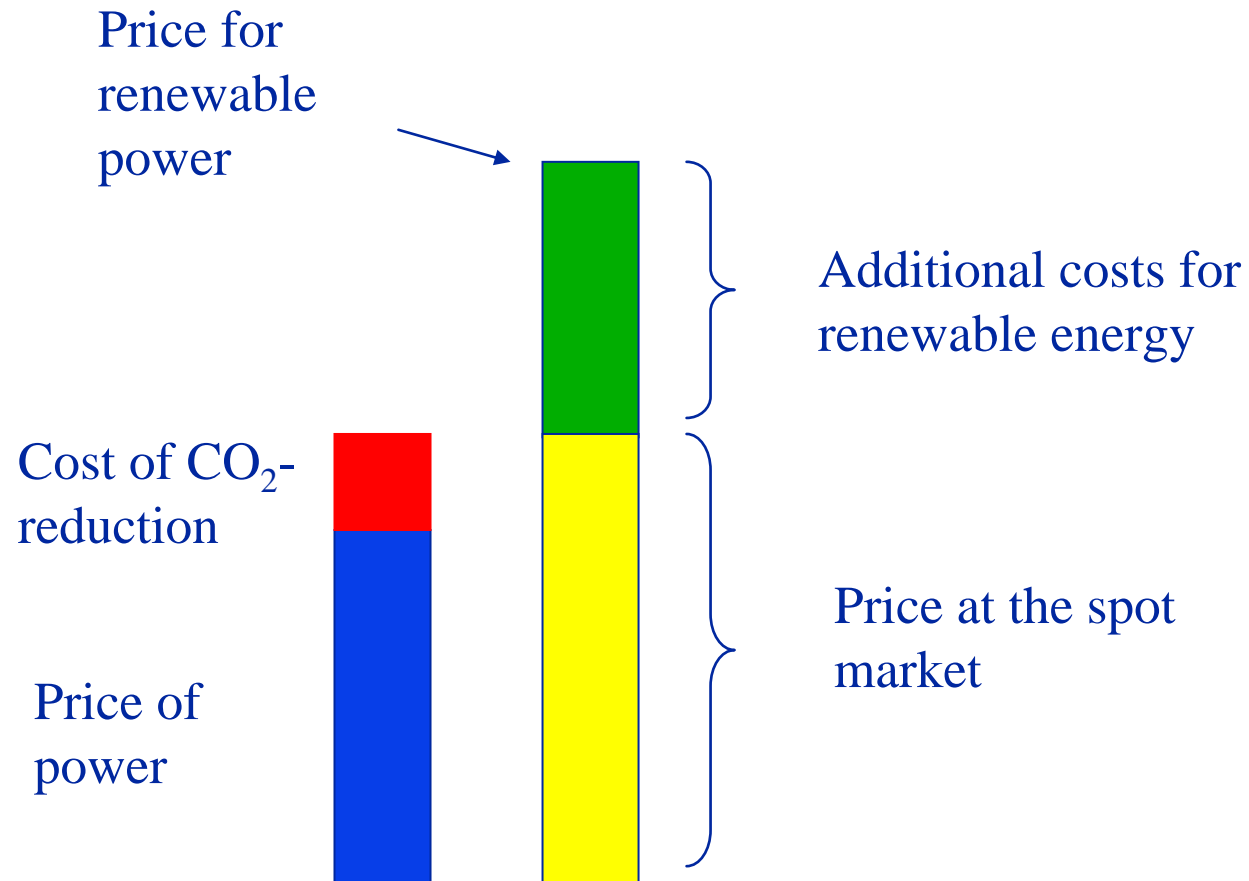
# TGC- and tradable permits markets combined within a liberalised power market

If the development of the TGC- and tradable permits quotas are adjusted in a co-ordinated manner these are strong instruments in achieving national CO<sub>2</sub> reductions

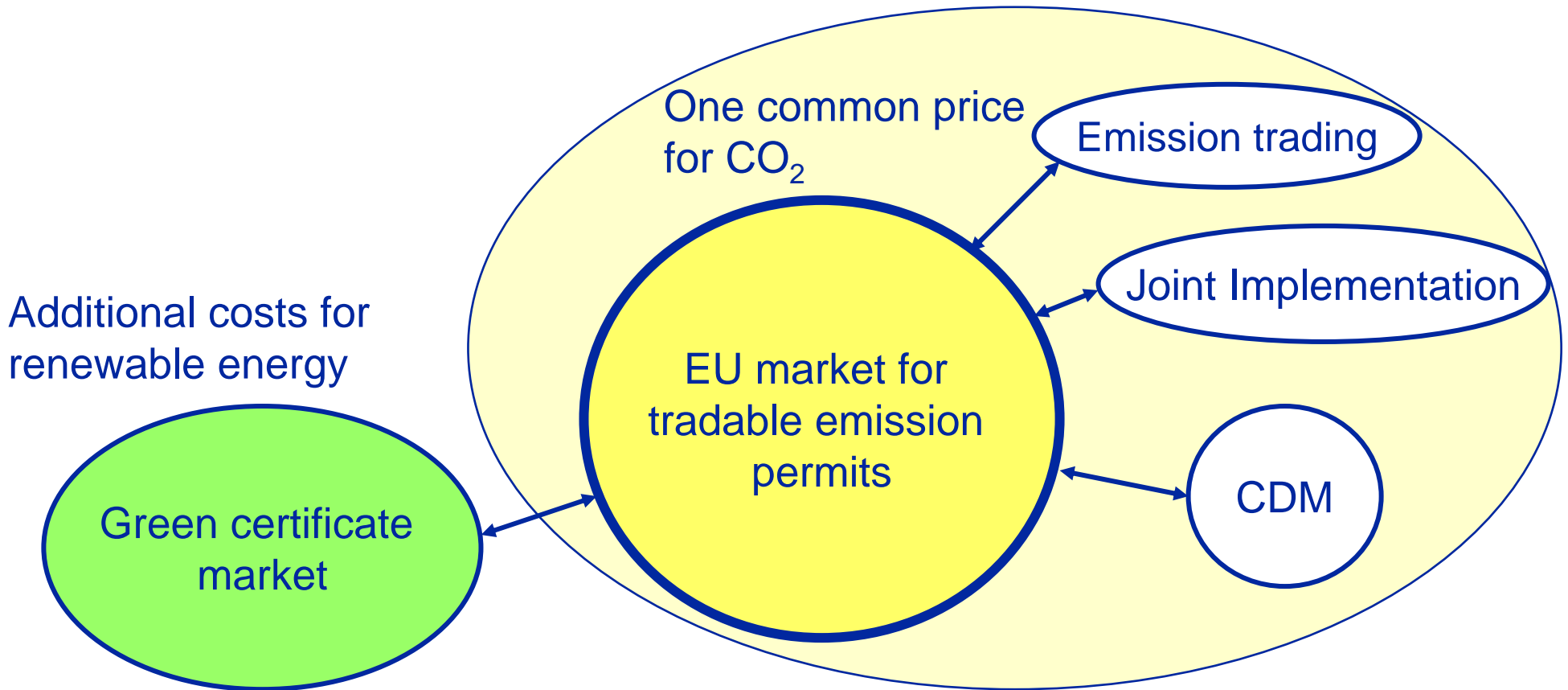
- When the green power production is increased, the tradable permits quota should be decreased correspondingly.
- A national co-ordination is sufficient although more CO<sub>2</sub> reductions are achieved by an international co-ordination

**The tradable permits market becomes the key market to ensure the environmental benefits in national GHG-strategies**

# Price-relations between certificates, emission permits and power



# Interacting markets



# Overall conclusion

National reduction targets for GHG-emissions do not go together with a liberalised power market!!

- The tradable permits market is the key to solve this problem
- An international TGC-market is well suited for developing renewables together with a tradable permits market
  - No CO<sub>2</sub>-reduction benefit is included in the price of a green certificate
- An EU emission trading market will be a cornerstone in relation to the use of Kyoto-instruments