



WP4 Trade offs and interactions

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Trade-offs - interactions?

- How different markets, instruments and technologies affect each other.
 - Do we have synergetic effects?
 - Do we see barriers?
 - Can the promotion of different technologies go hand in hand?
 - Which instruments should be used at what level?



What are we looking at?

- Technologies
 - Renewables, CHP and DSM
- Markets
 - the physical power market, environmental markets, green markets
- Instruments
 - feed-in, tendering, green certificates, emission trading, Kyoto-mechanisms
- Levels of analysis
 - National, EU and international level



Three international markets

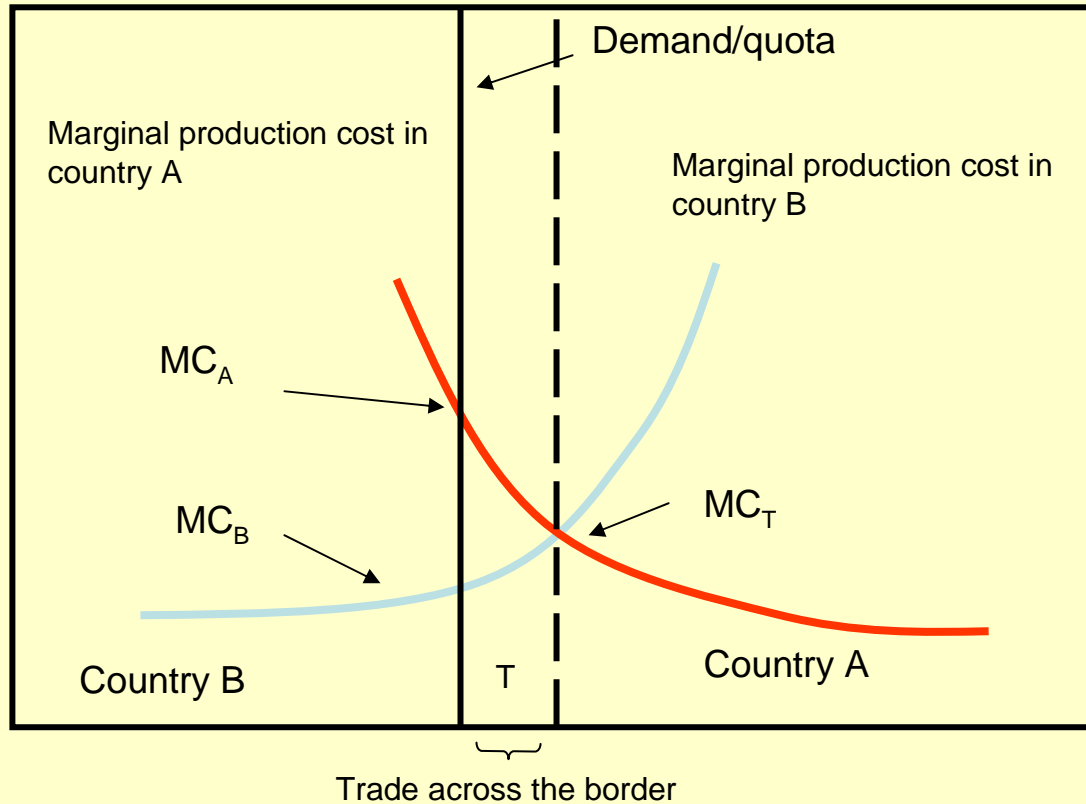
- The liberalised power market
- A green certificate market for renewables
- CO₂-allowance market

What do we want to achieve:

- an efficient power supply with low prices for the consumers
- to promote the development of RES
- to reduce the emissions of CO₂



Efficiency = trade across the borders





So what is the problem?

- It should be possible to reach the three goals using three instruments

- **But the instruments interact!!!**

We cannot be sure to get the results we expect.

- What follows will only give a fragmented picture of interactions between technologies, instruments and markets



So it is correct, that we by using an international :

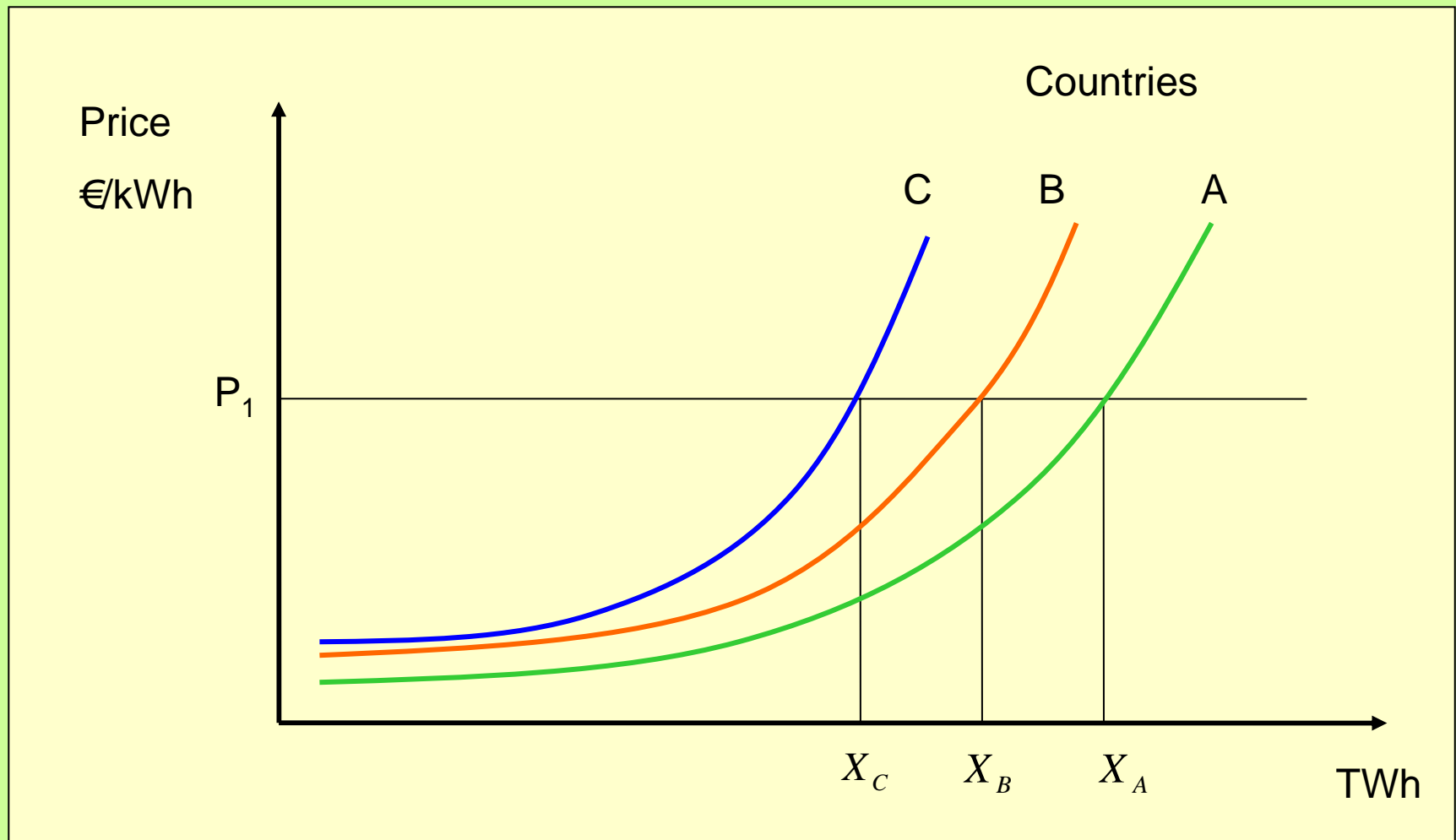
- *Power market* will get the lowest power production costs
- *Green certificate market* will reach the target for renewable development at the lowest costs
- *CO₂-trading* will achieve the CO₂-reduction targets to the lowest costs

But there will be quite a difference between the participating countries

- quite different power prices for the consumers due to different TGC-targets
- very different national CO₂-reduction compared to the efforts we undertake (RES development)

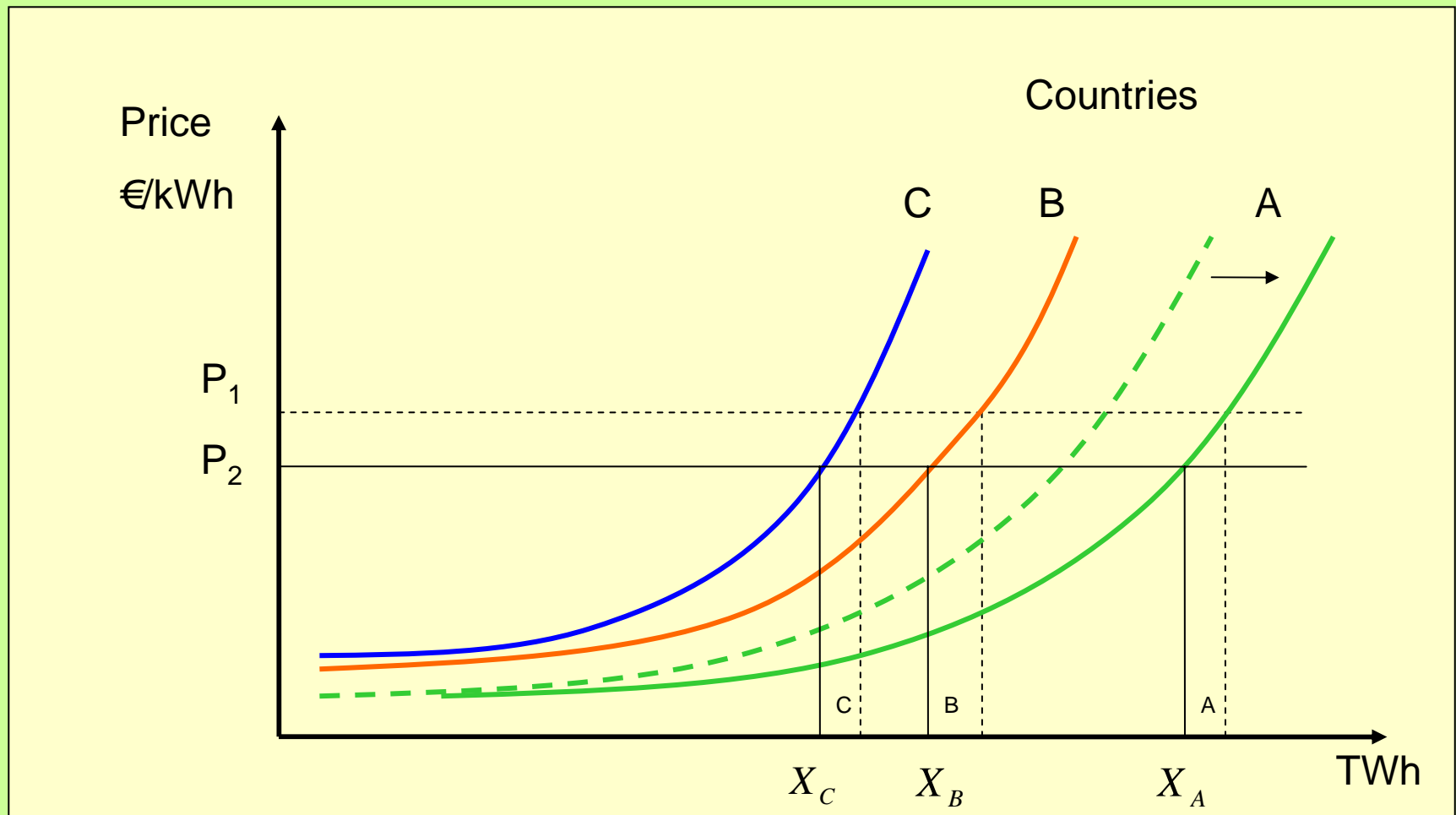


Determination of power prices



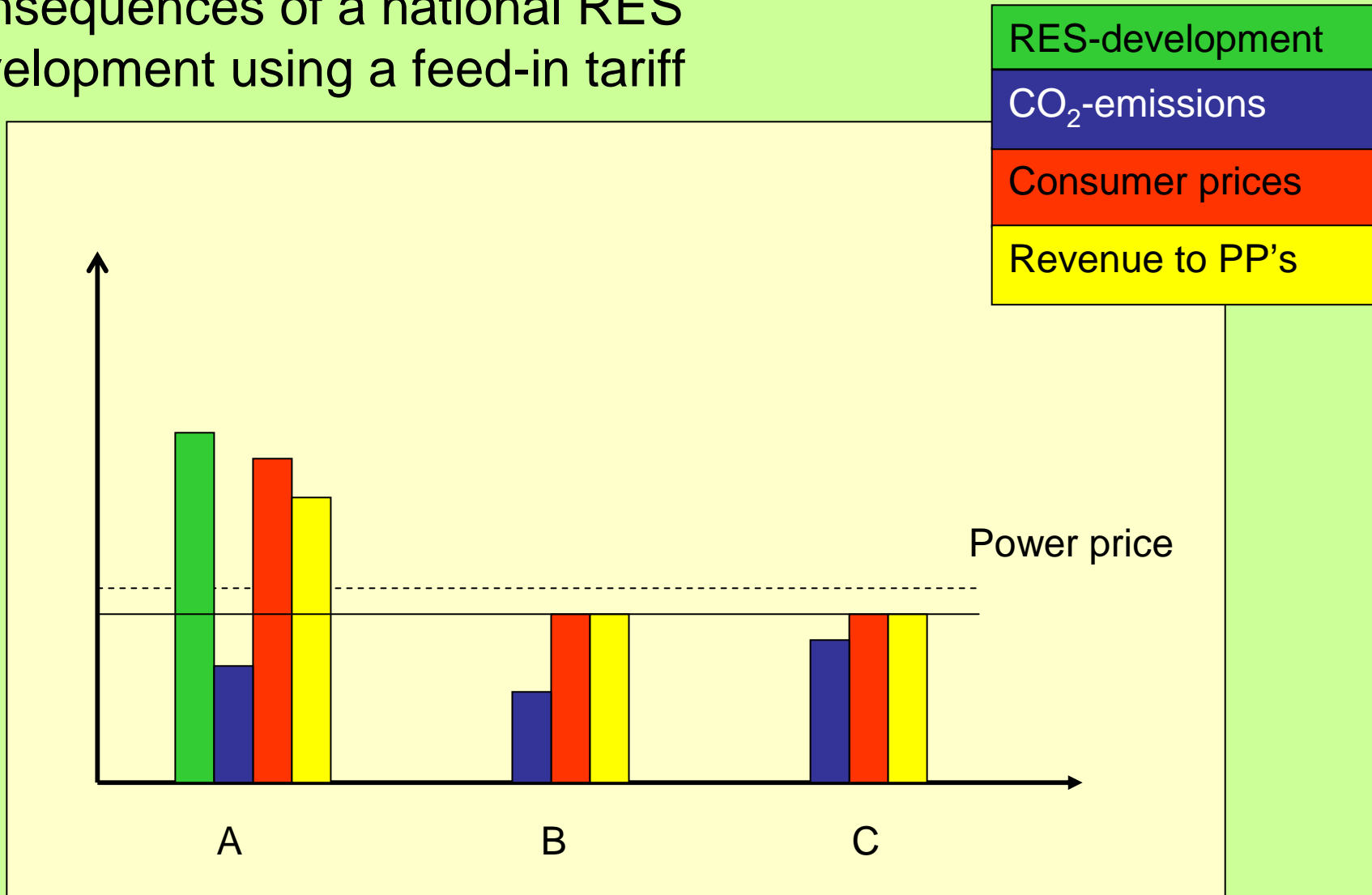


National RES development in country A





Consequences of a national RES development using a feed-in tariff

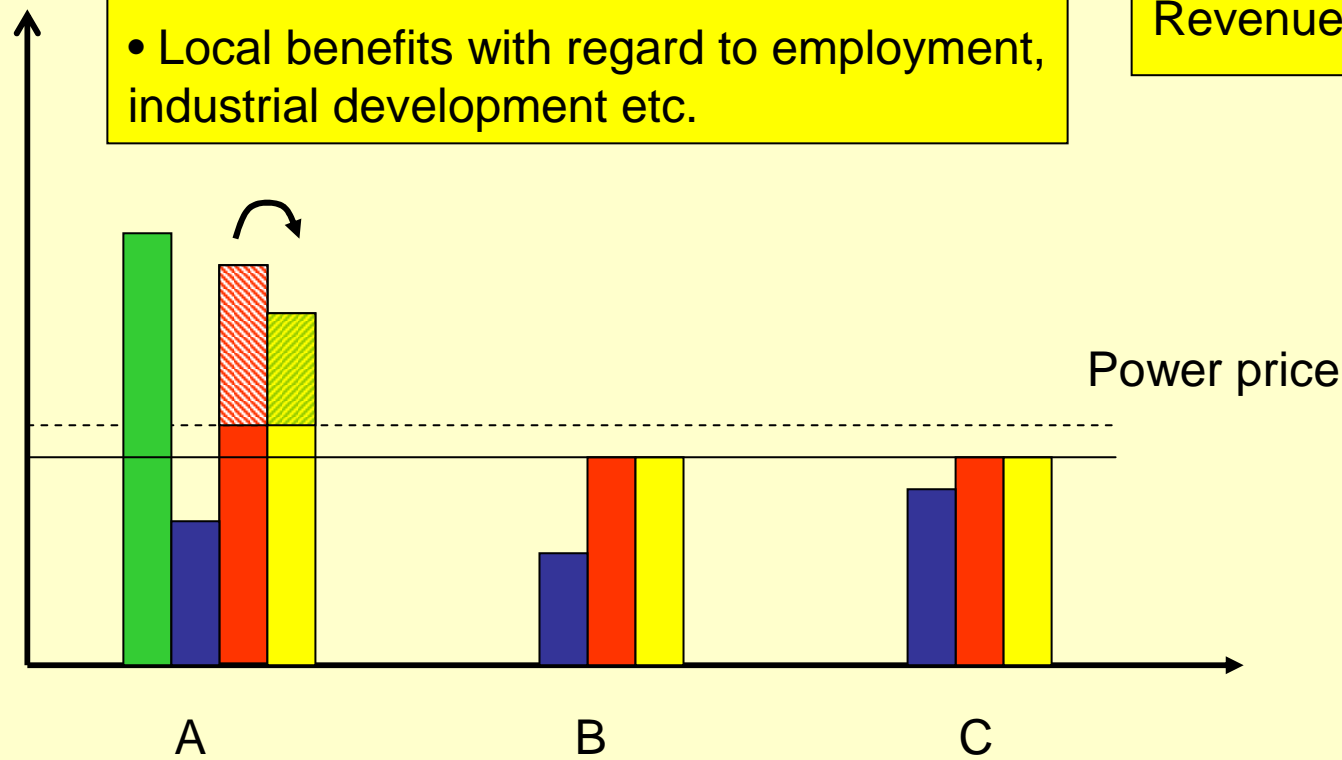




Pros et cons for country A

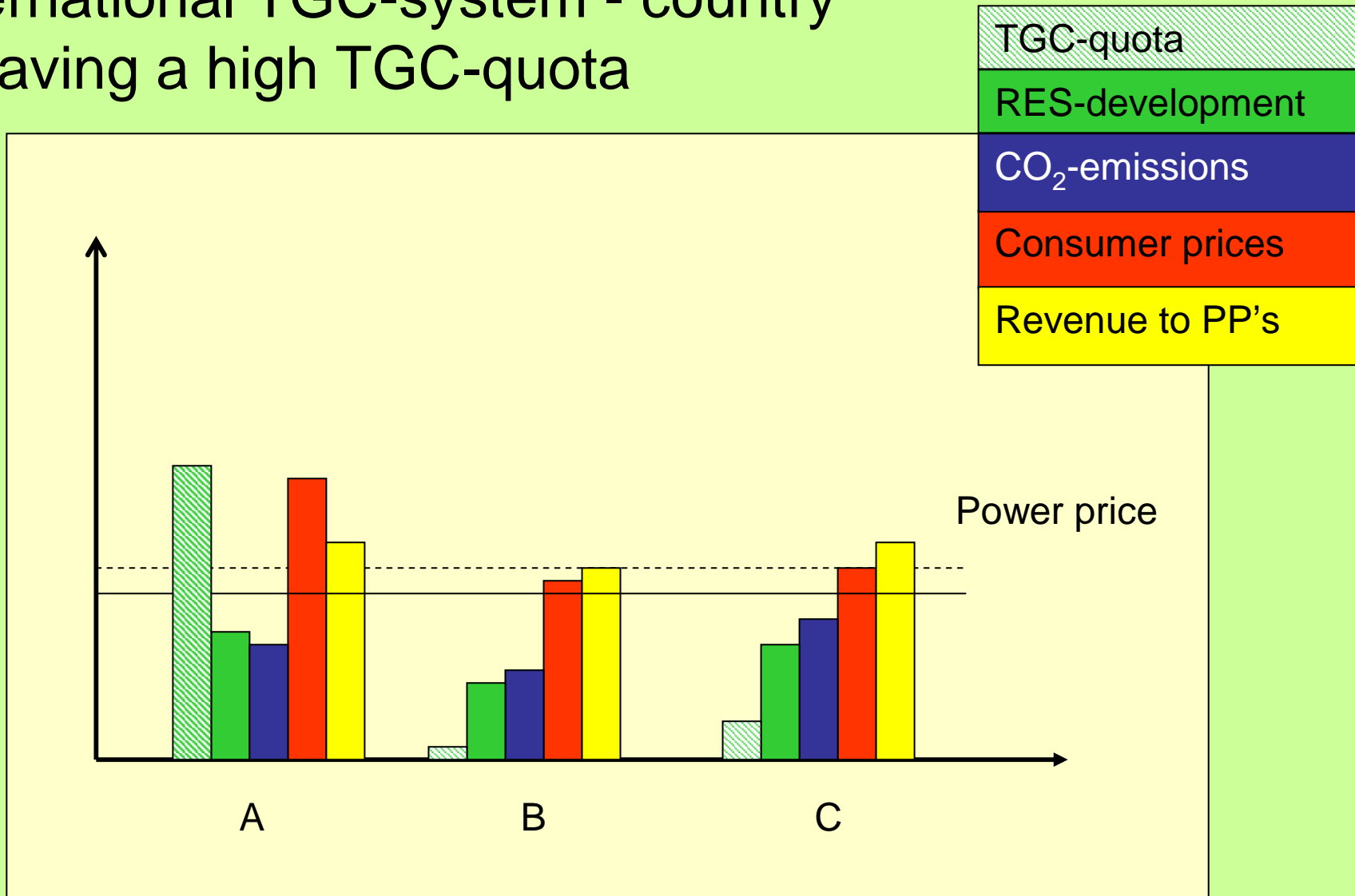
- CO₂-benefits have to be shared
- RES is implemented nationally
- Local benefits with regard to employment, industrial development etc.

RES-development
CO ₂ -emissions
Consumer prices
Revenue to PP's





International TGC-system - country A having a high TGC-quota

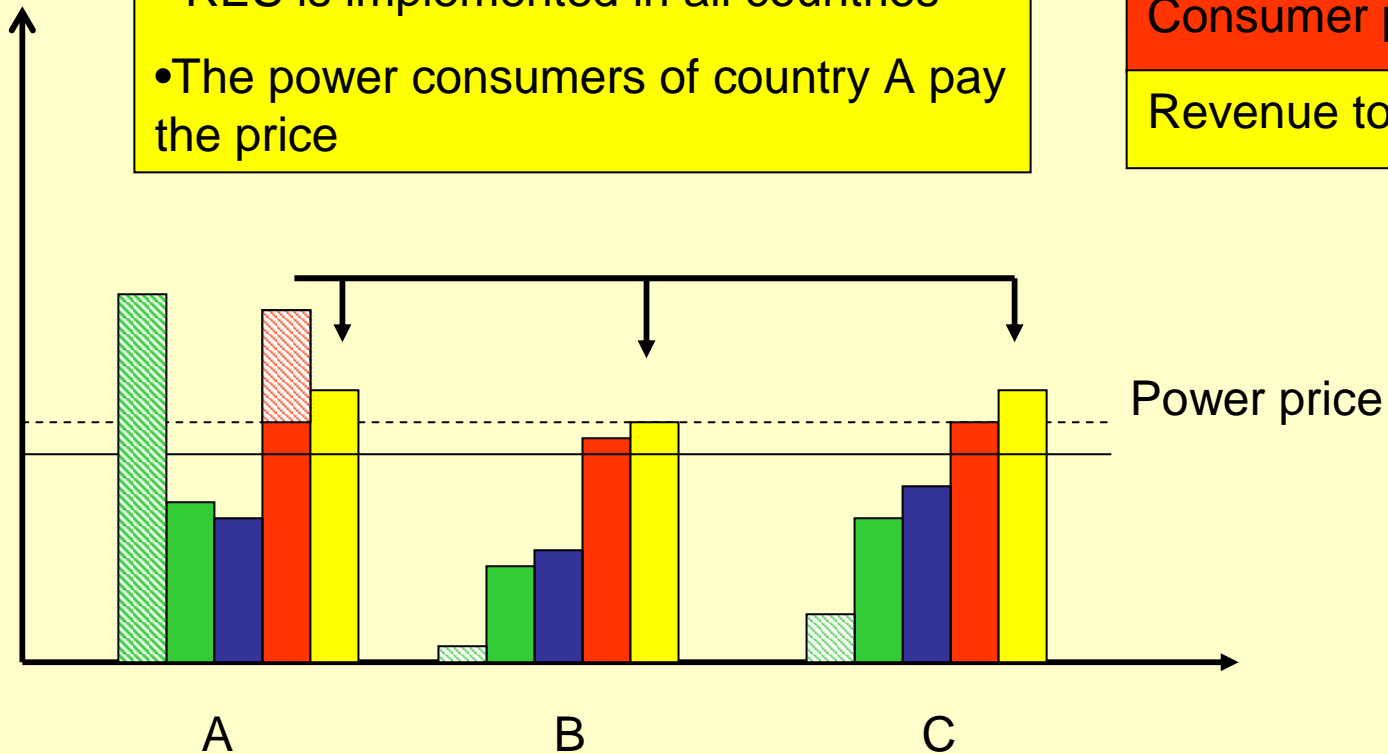




Consequences of country A having a high RES target

- CO₂-benefits have to be shared
- RES is implemented in all countries
- The power consumers of country A pay the price

TGC-quota
RES-development
CO ₂ -emissions
Consumer prices
Revenue to PP's





International power market combined with an international green certificate market

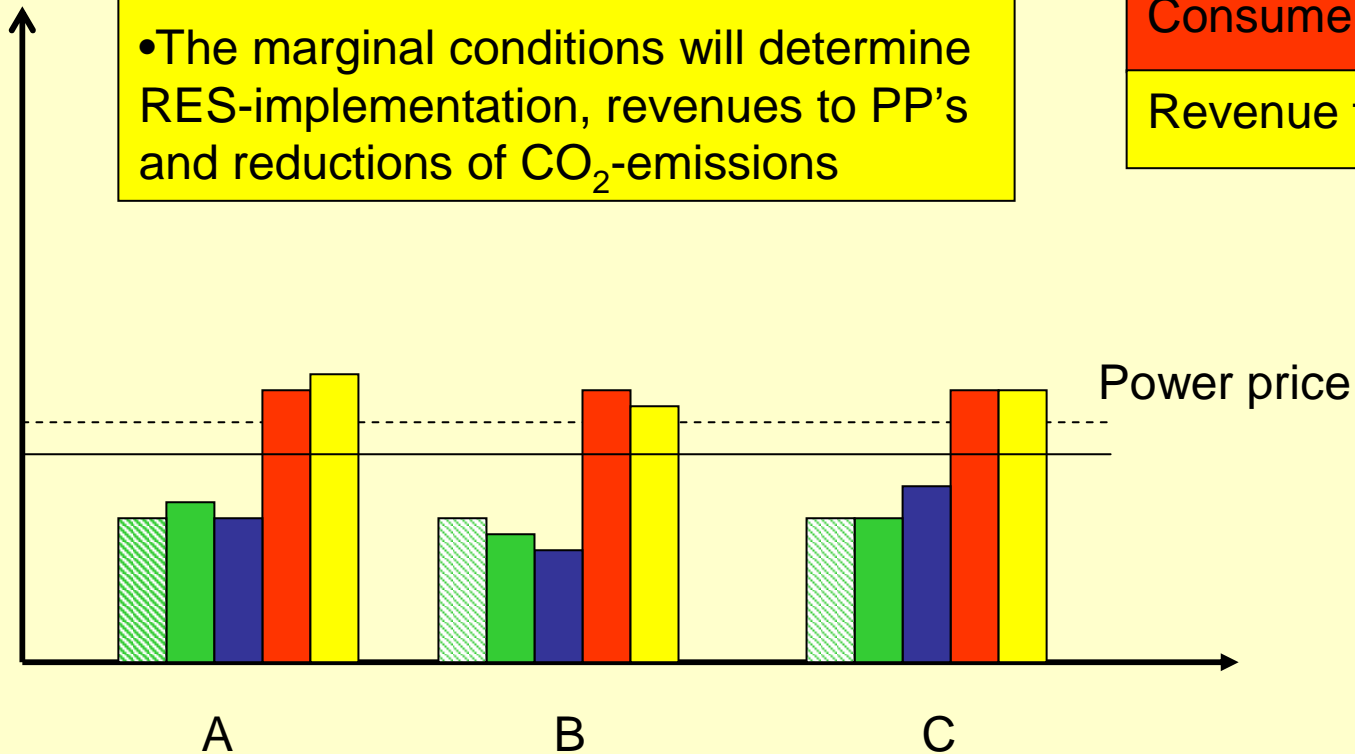
- CO₂-reductions have to be shared with other countries as was the case in a domestic RES-development
- Other locale benefits will be shared as well
- The total cost of reaching the RES-target will presumably be lower owing to international trade in TGC's
- Electricity consumers in country A will have to pay most of the costs of the RES-development, both to domestic power producers and those abroad.



Same TGC-quota in all countries

- The power price for consumers will be identical in all countries
- The marginal conditions will determine RES-implementation, revenues to PP's and reductions of CO₂-emissions

TGC-quota
RES-development
CO ₂ -emissions
Consumer prices
Revenue to PP's

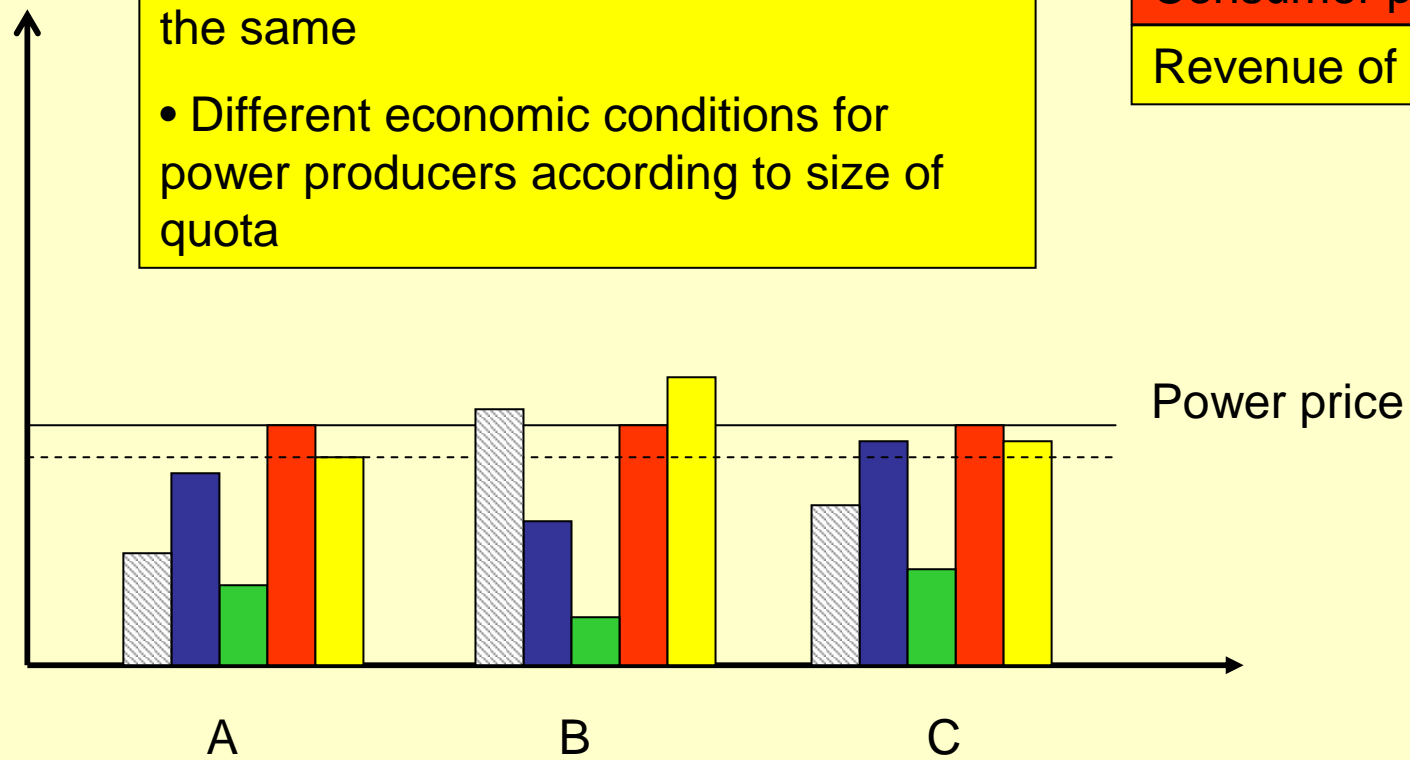




Consequences of different CO₂-quotas

CO ₂ -quota
RES-development
CO ₂ -emissions
Consumer prices
Revenue of PP's

- The power price for consumers will be the same
- Different economic conditions for power producers according to size of quota



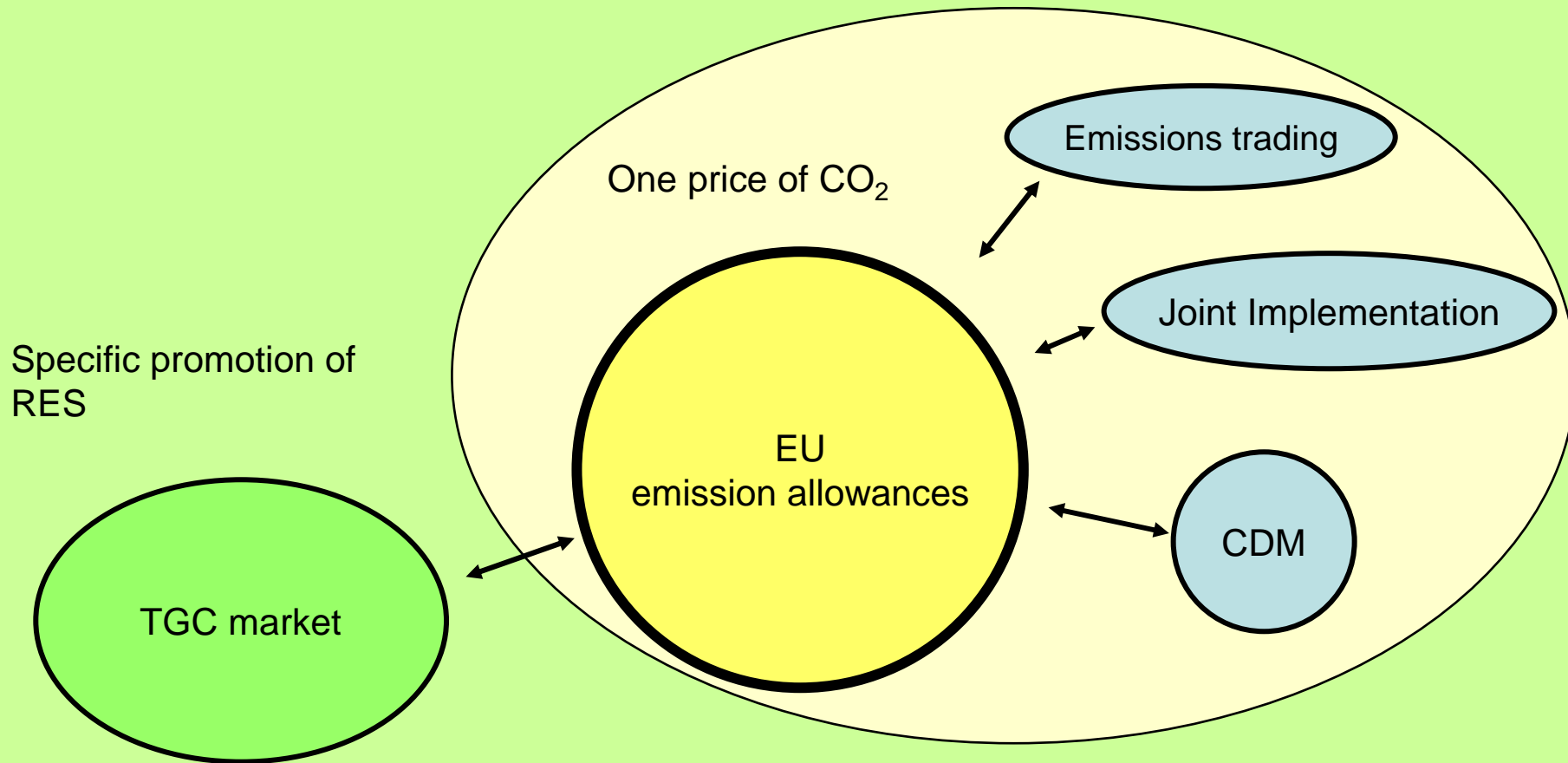


CO₂ emission trading

- The price of power will be the same for all power consumers within the market
- If allowances are grandfathered the costs for power producers will be biased - the higher the CO₂-quota compared to reduction options the more they will benefit
- Using an auction method no bias between producers will arise



Linked markets





Conclusions

- Trade-off's between different markets and instruments are complex issues
 - Hopefully a major part of the results can be implemented in the Green-X model
- Not all but an important part of the total picture will be painted in this project
 - Emphasis on the EU-level