vito
vision on technology

11/09/2014

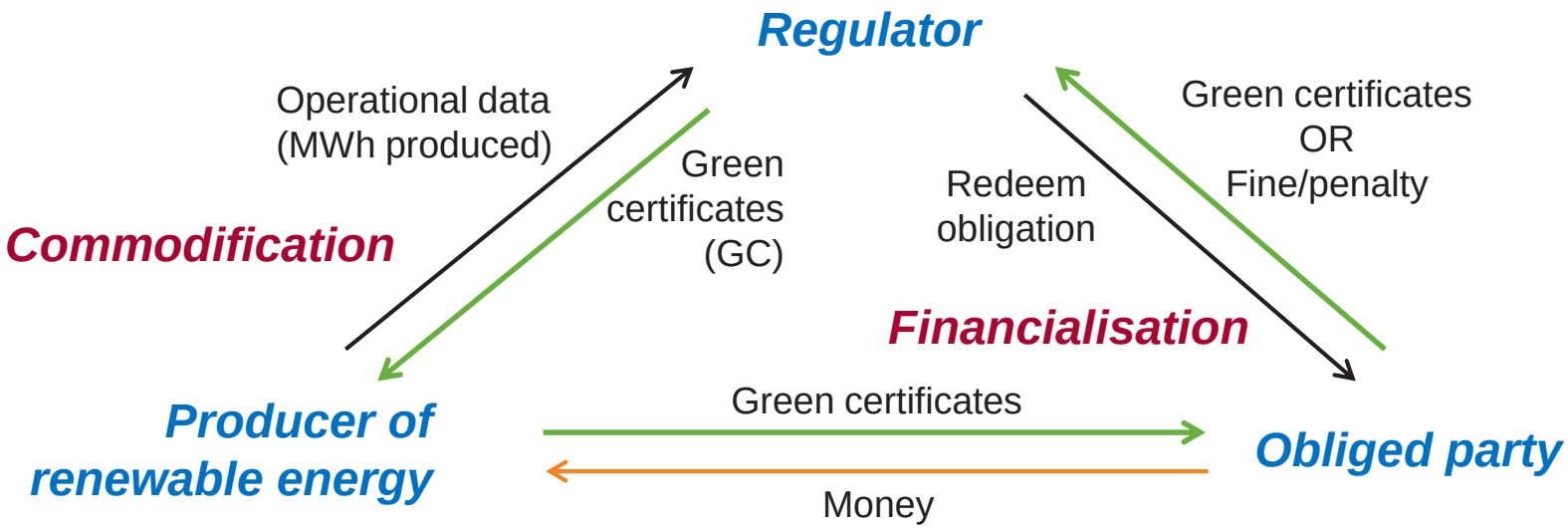
Analysis of the Commodification and Financialisation Aspects of the Green Certificate Schemes in Flanders and Norway

Erwin CORNELIS, Asgeir TOMASGARD, Arne LIND, Iain MacGILL

IEPPEC – Berlin – Sept 9-11, 2014

Analytical framework

- Support to renewable energy (RE)
  - Price based approach: feed-in tariffs, feed-in premiums, …
  - Quantity based approach: ***certificate schemes***, tendering, auctioning, …



© 2014, VITO NV

Analytical framework

- Support to renewable energy (RE)
  - Quantity based approach: ***certificate schemes***

    ⇒ A process of renewable energy ***commodification*** and ***financialisation***

A process by which distinct goods with different attributes and values are transformed into simple fungible commodities within undifferentiated price competition

A process that aims to reduce any produced good or service into an exchangeable financial instrument which can be easily traded

© 2014, VITO NV

Analytical framework

Analysis of design and performance of 2 tradable green certificates schemes:

- Flanders (Belgium)
- Sweden-Norway

By focussing on:

- Commodification
- Financialisation

Aspects

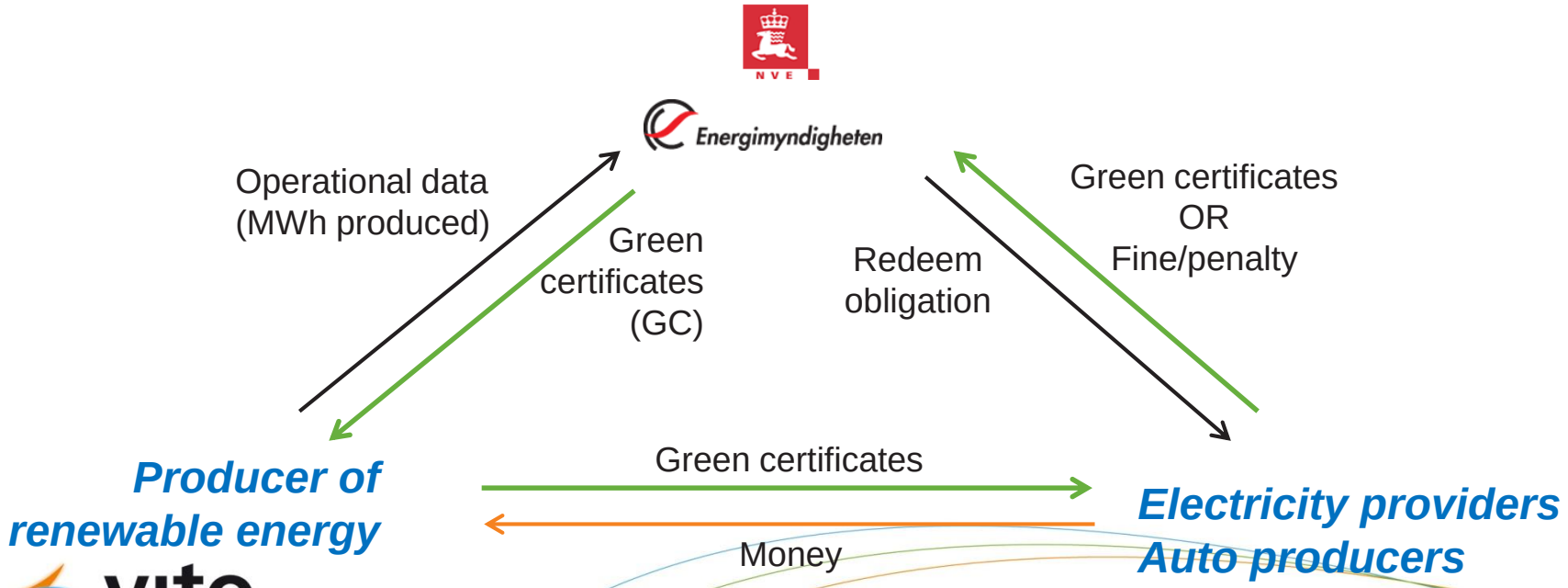
In order to get a better understanding of:

- Effectiveness
- Cost-efficiency
- Distribution of risks

© 2014, VITO NV

Swedish-Norwegian Green Certificate Scheme

- Renewable energy objectives
  - Norway: 67,5% Renewable Electricity (RE) by 2020
  - Since 2003: a Green Certificate Scheme (GCS) in Sweden
  - In 2012: a GCS for Norway – linked with Swedish scheme
    - Common market for GC Norway-Sweden



© 2014, VITO NV

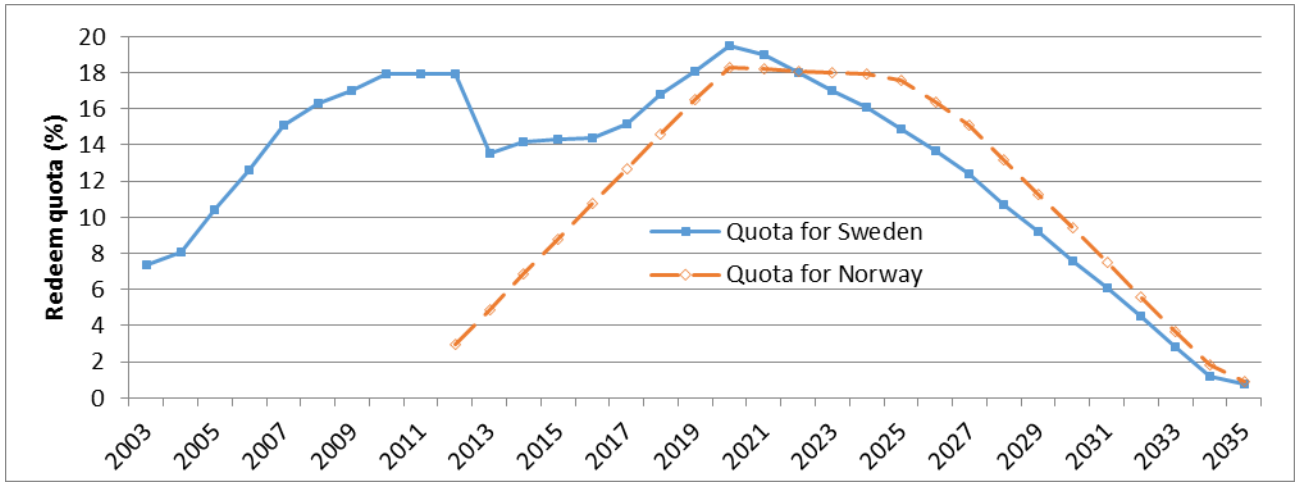
Swedish-Norwegian Green Certificate Scheme

- ***Commodification*** aspects
  - 1 GC = 1 MWh renewable electricity
  - Technology neutral
  - Eligible technologies: biomass, geothermal, solar, hydro, wind and wave energy
    - In Sweden: peat for CHP plants
  - New plants or expansion of existing plants
  - For 15 years – no longer than 2035

© 2014, VITO NV

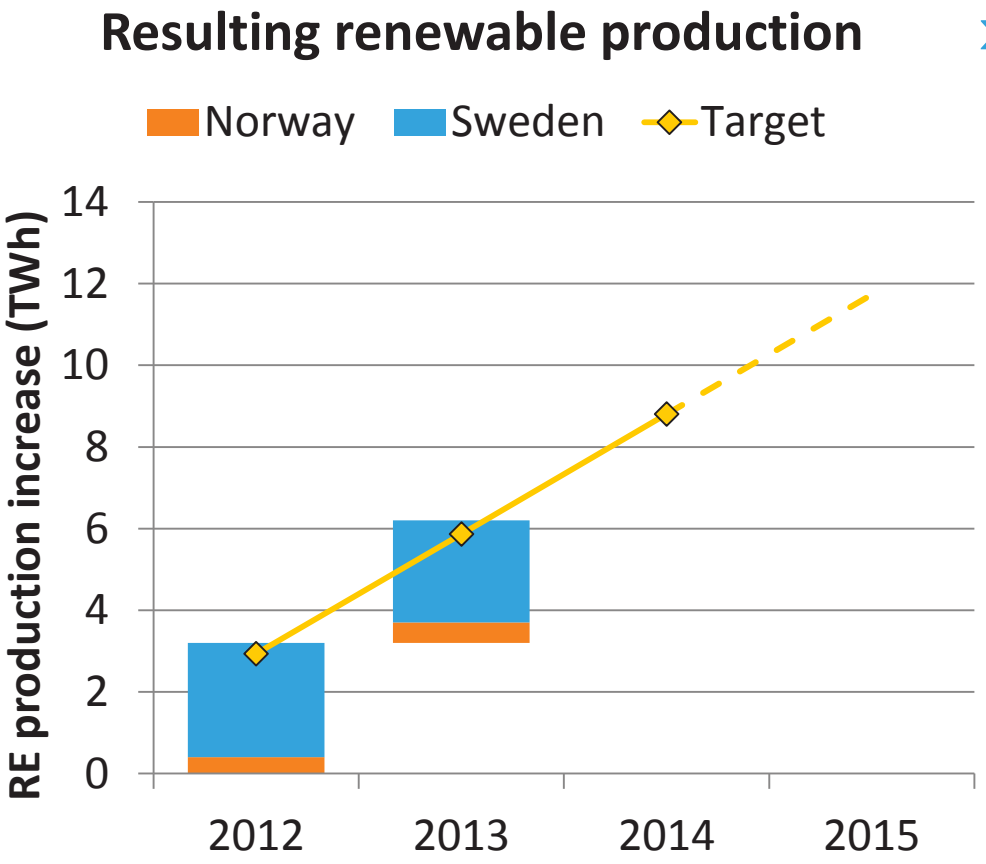
Swedish-Norwegian Green Certificate Scheme

- ***Financialisation*** aspects
  - Redeem quota designed in such a way that each country will generate an equal capacity in RE (13,2 TWh/year) by 2035
  - Revision of target every 4 years possible
  - Penalty for non-delivery (150% of average GC-price of previous year)



© 2014, VITO NV

Swedish-Norwegian Green Certificate Scheme



- Effectiveness
  - On schedule
  - But: asymmetry in investments: Sweden >> Norway

© 2014, VITO NV

Swedish-Norwegian Green Certificate Scheme

- Reasons for asymmetry in investments
  - Differences in depreciation rules (faster in Sweden)
  - Differences in tax regime (lower income tax in Sweden, additional tax for hydropower in Norway)
    - 5.6 TWh of mainly wind power in Norway may be crowded out by more expensive Swedish projects
  - Difference in commodification aspects of both schemes
    - Swedish projects, in operation after 2020, will be part of the scheme – Norwegian ones not
    - Less appetite to invest in Norway
- Conclusion:
  - Swedish-Norwegian scheme is effective in achieving the results
  - BUT not in the most cost-efficient way

© 2014, VITO NV

Swedish-Norwegian Green Certificate Scheme

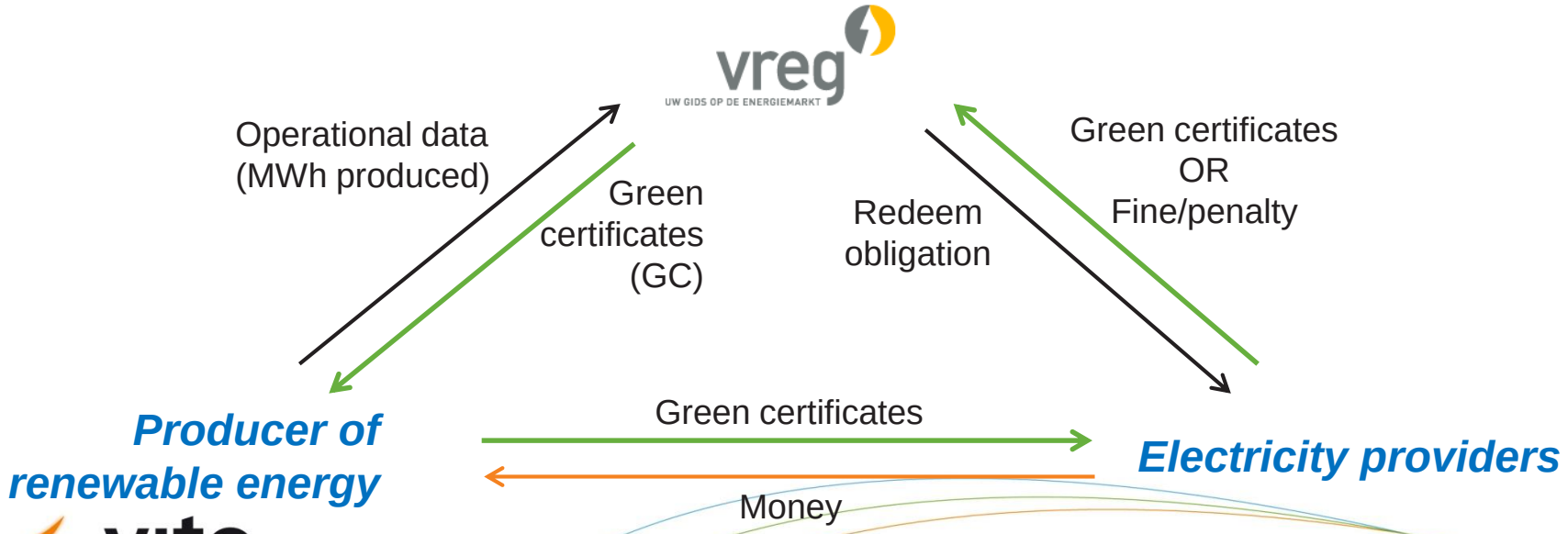
- Distribution of risks
  - Mainly for the investors
    - No limit to number of certificates ⇒ risk of oversupply ⇒ risk of decline in certificate price
      - Investors might postpone investment decision: more likely in Norway than in Sweden
  - For the government: little or no risk
    - 398 TWh guaranteed
    - Overinvestments: target will be met
    - Under investments: further incentives may be given (increase of redeem quota)

© 2014, VITO NV

Flemish Green Certificate Scheme

- Renewable energy objectives
  - In 1999: 0,03% in 1999 → 3% by 2004
  - At this time: an EU-wide GCS expected

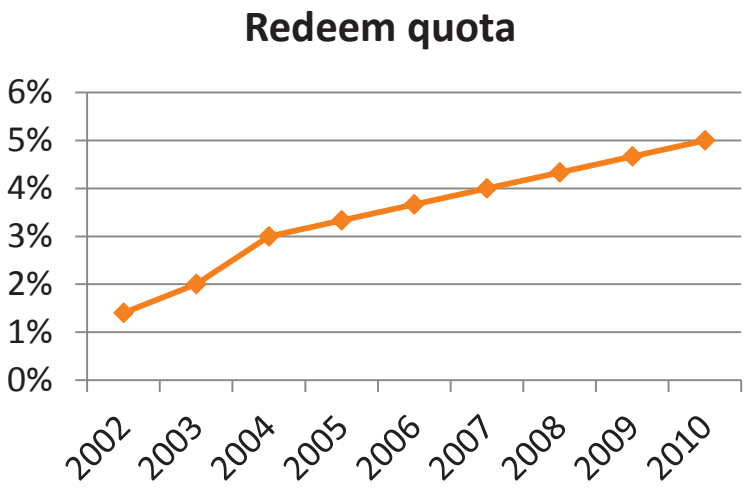
    ⇒ GSC selected as policy instrument in Flanders
    - GSC scheme operational since 2002; since then: amended



© 2014, VITO NV

Flemish Green Certificate Scheme

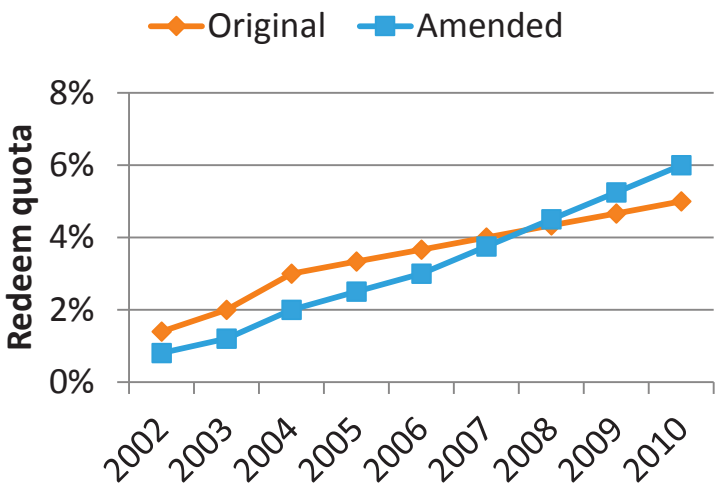
- ***Commodification*** in the original design
  - 1 GS = 1 MWh renewable electricity
  - Technology neutral
  - Eligible technologies: wind on-shore; hydro; tidal energy; geothermal; biogas; landfill gas; biomass
- ***Financialisation*** in the original design
  - Redeem quota
  - Penalty for non-delivery
    - Set at 125€/lacking GC
    - Sets ceiling price in GCS



© 2014, VITO NV

Flemish Green Certificate Scheme

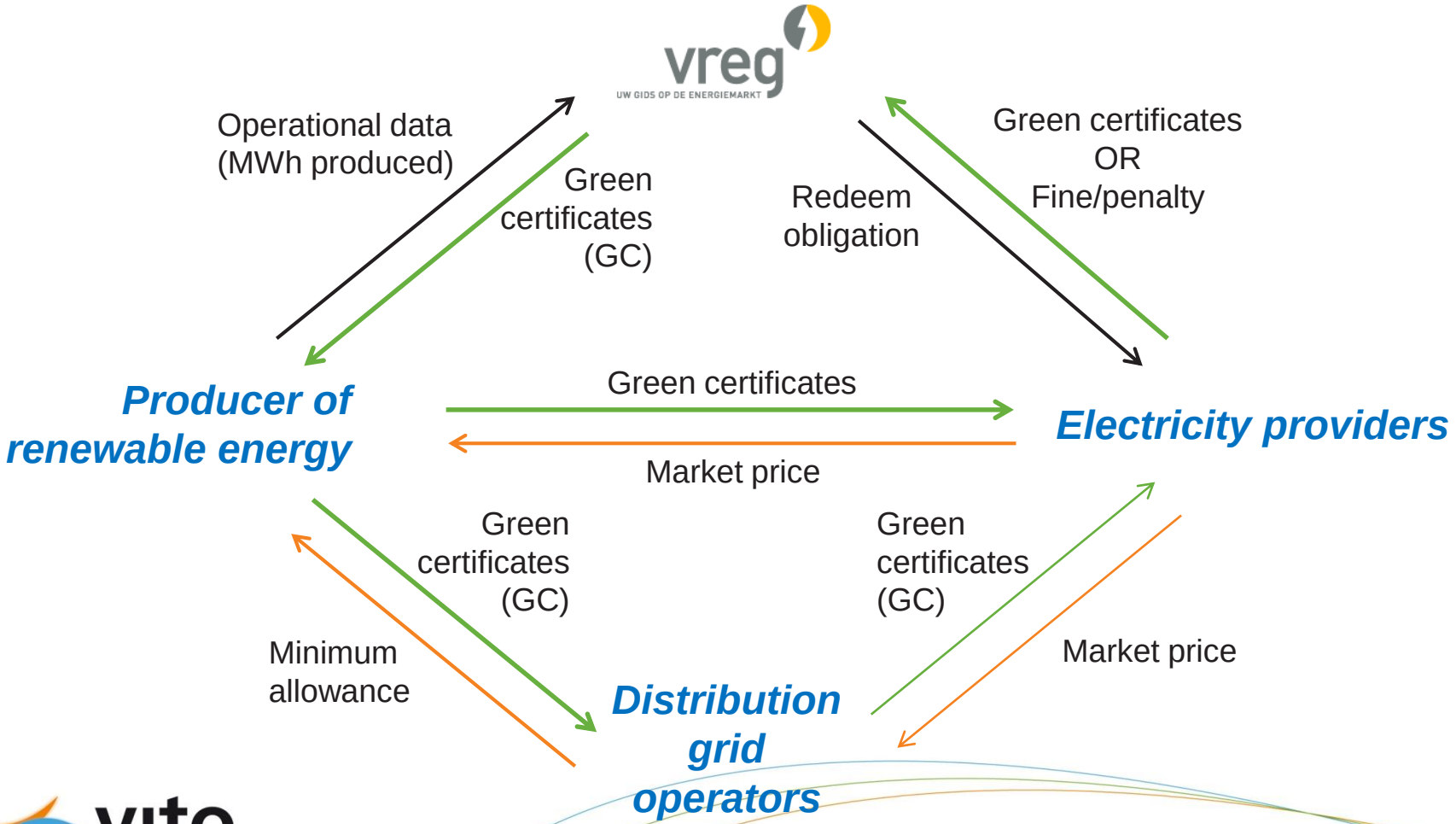
- Amendments
  - In 2003 already
  - RE did not develop as anticipated
  - Amendments in ***financialisation*** aspect
    - New redeem quota
    - Amended penalty
      - 2002: 75€
      - 2003: 100€
      - 2004:-…: 125€



© 2014, VITO NV

Flemish Green Certificate Scheme

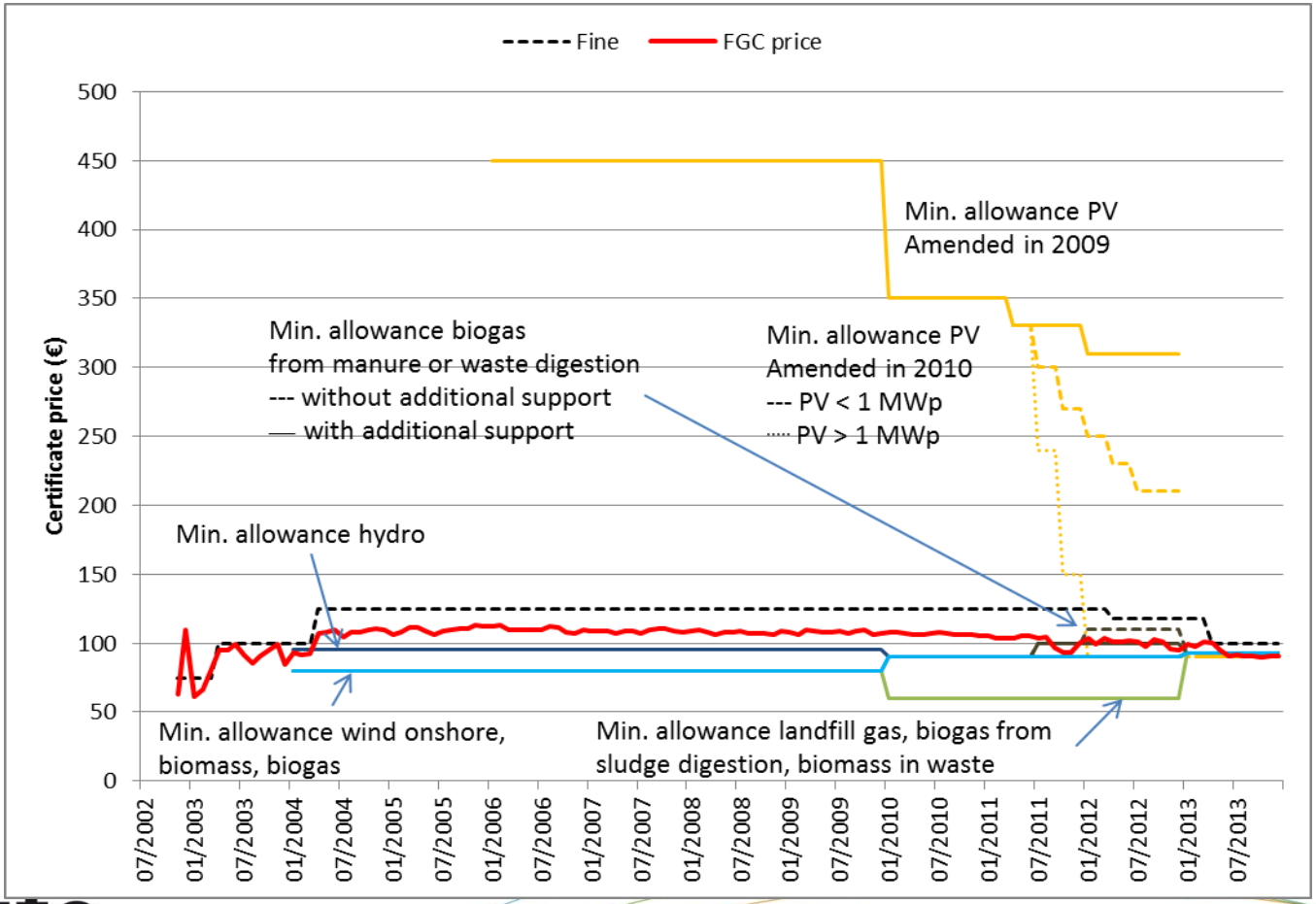
- Amendments: in ***financialisation*** aspect
  - 2004: introduction of minimum allowances: sets floor price for GC



© 2014, VITO NV

Flemish Green Certificate Scheme

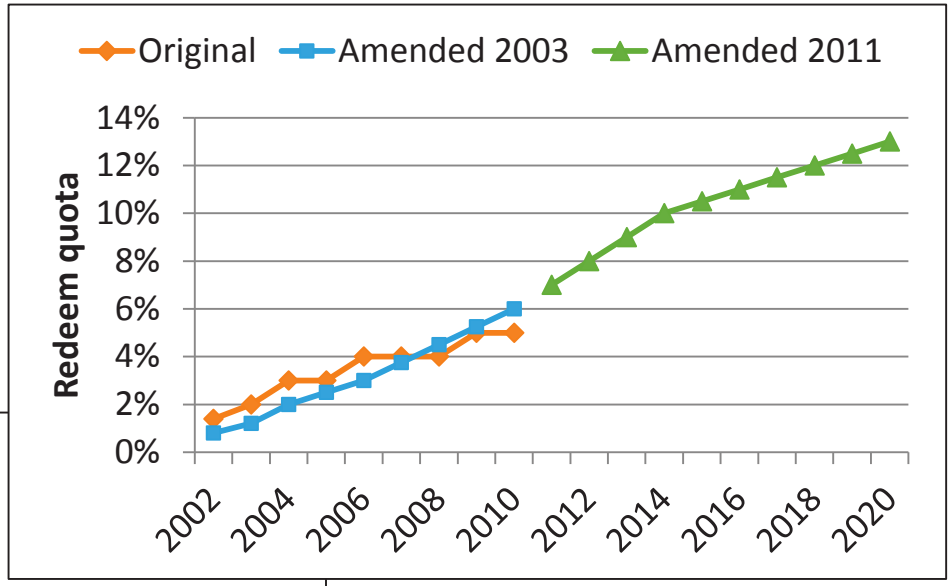
- Amendments: in ***financialisation*** aspect
  - 2006: minimum allowances for PV above market price

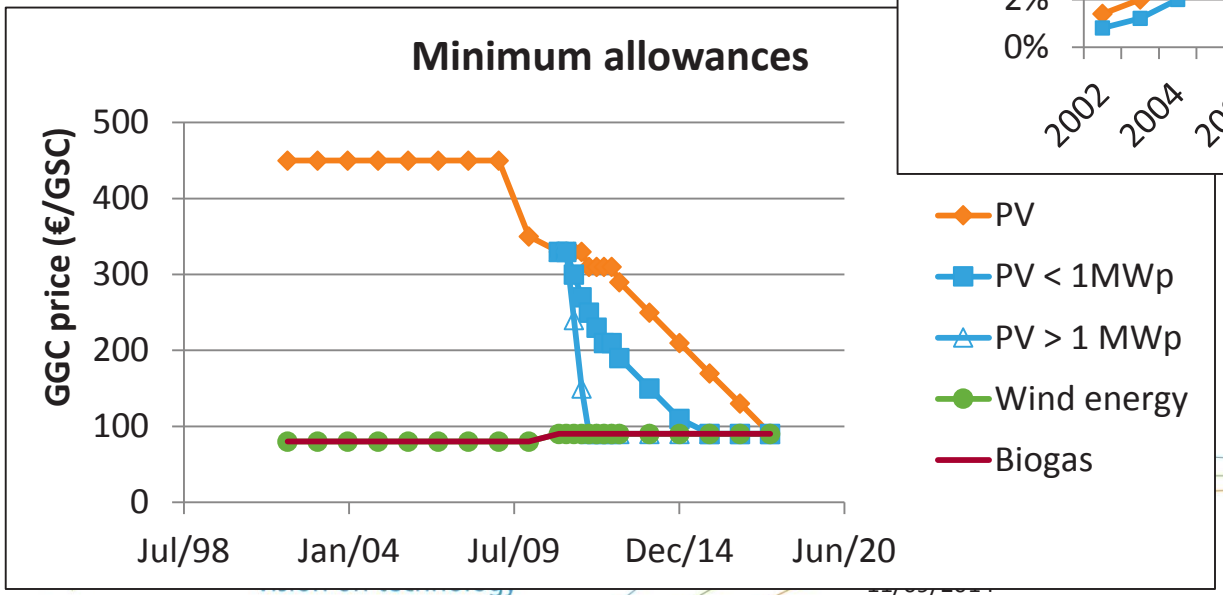


© 2014, VITO NV

Flemish Green Certificate Scheme

- Amendments of 2004-2006
  - Resulted in a boom in PV-investments
  - Cost went out of hand
- Amended minimum allowances in 2009 and redeem quota in 2011





© 2014, VITO NV

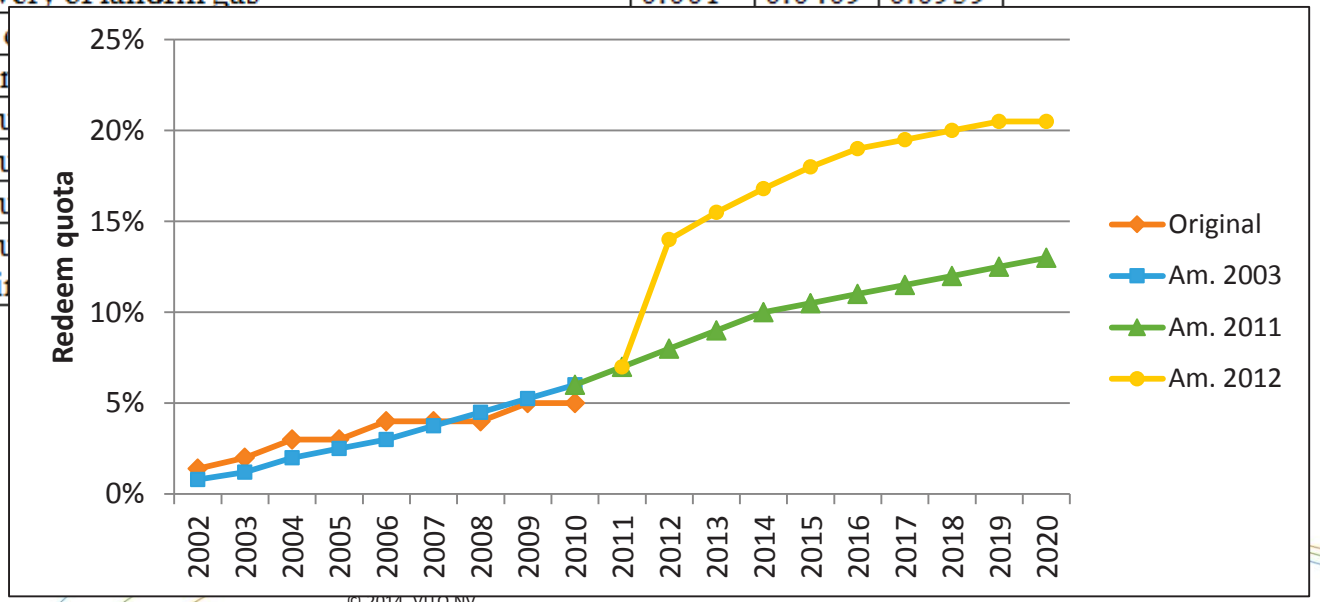
Flemish Green Certificate Scheme

- New amendments: in ***commodification*** aspect
  - Introduction of banding in 2009
    - Co-firing biomass : ~~1~~ GSC / 1 MWh $\Rightarrow$ 0.5 GSC / 1 MWh
- 2011: thorough evaluation of GSC
  - Generalisation of banding factor for all technologies
    - Technology specific
    - Revised annually
    - Can vary between 0 and 1.25 GSC/MWh (in practice: 0 - 1)
    - Price band between fine and minimum allowance: narrowed to 93-100€ / GC
  - Redeem quota: increased

© 2014, VITO NV

Flemish Green Certificate Scheme

Banding factor or the number of FGC issued per MWh renewable electricity produced		New in 2013	New in 2014	New in 2015(*)
Photovoltaic	Transformer capacity < 10kW	0.23	0.268	0
	Transformer capacity 10kW - 250kW	0.63	0.522	0.600
	Transformer capacity 250kW - 750kW	0.49	0.436	0.496
Wind on-shore	Maximum turbine capacity ≤ 4MWe	0.80	0.777	0.692
Biogas; electrical capacity ≤ 5 MWe	For digestion of manure and agricultural products	1	1	1
	For digestion of gardening and kitchen waste	1	1	1
	For heat recovery of landfill gas	0.196	0.241	0.304
	For digestion of sewage sludge	0.208	0.329	0.367
	Other digesters	1	1	1
Biogas; electrical capacity 5 – 20 MWe	For digestion of manure and agricultural products	1	1	1
	For digestion of gardening and kitchen waste	1	1	1
	For heat recovery of landfill gas	0.001	0.0409	0.0959
	For digestion			
	Other digester			
Biomass; electrical capacity ≤ 20 MWe	For the combu			
	For the combu			
	For the combu			
	For the combu municipal or i			

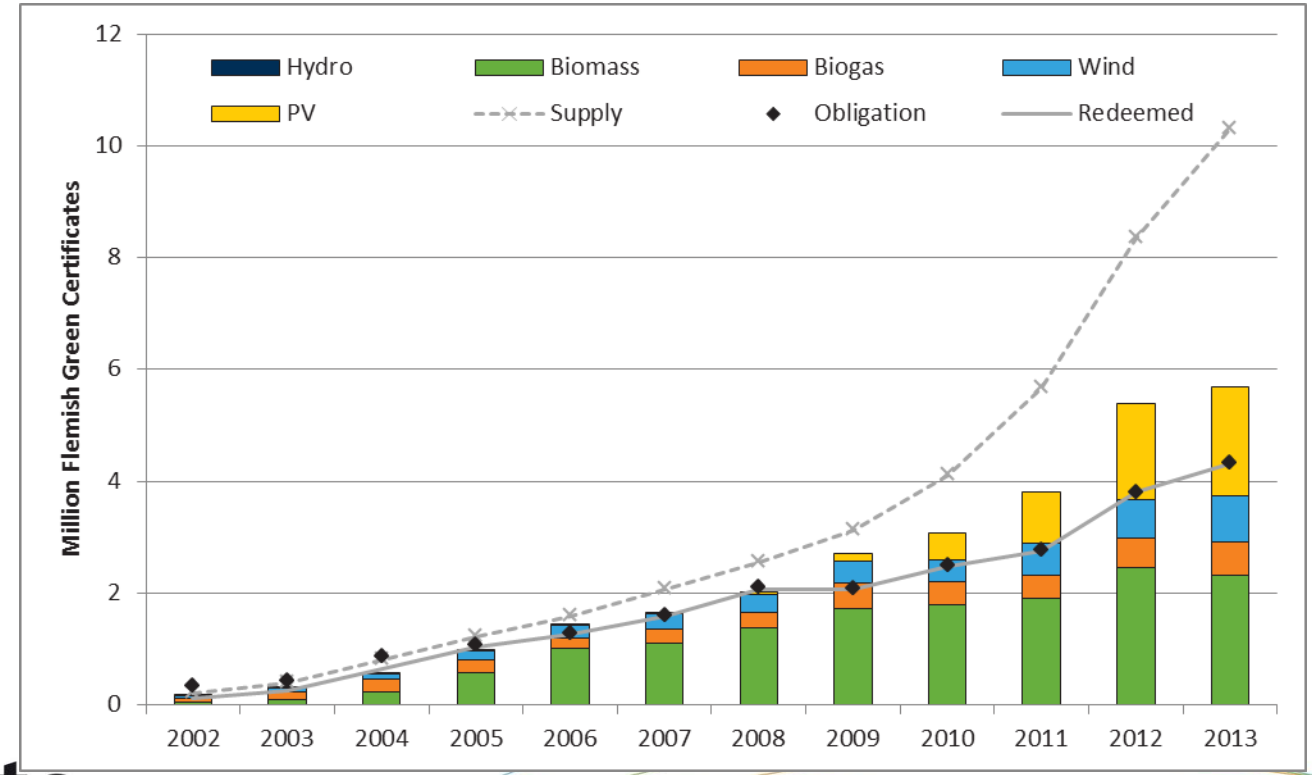


vito
vision on technology

© 2014, VITO NV

Flemish Green Certificate Scheme

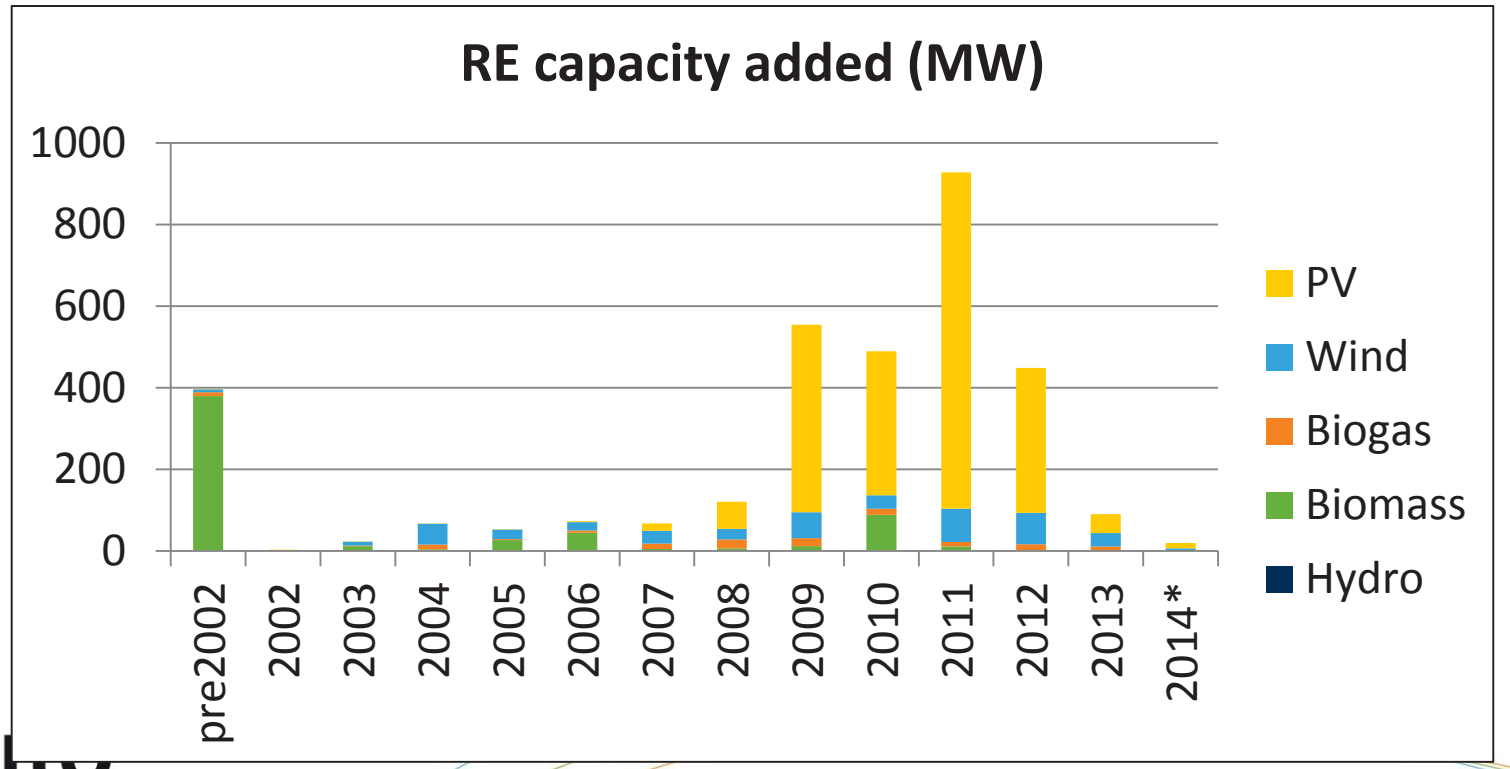
- Effects of Flemish Green Certificate Scheme:
  - In 2010: 3.1 TWh RE energy produced = 6 % target ⇒ Effective
  - Due to boost in PV investments ⇒ not cost-efficient



© 2014, VITO NV

Flemish Green Certificate Scheme

- Reform of scheme in 2012:
  - Quantity based approach → price base approach
  - Stand-still in investments (temporary ?)
    ⇒ cost-efficient, but risks not to be effective



© 2014, VITO NV

Flemish Green Certificate Scheme

- Distribution of risk

  Electricity providers: risk of fine (not enough certificates)

  ↓ Within limits: due to fixed fine

  ↓ ⇒ Other redeem quota path

  Investors: decline in certificate price

  ↓ ⇒ Minimum allowances

  Distribution grid operators: extra costs

  ↓ ⇒ Socialisation of costs between each other

  Investors in 2012: uncertainty on how the amended scheme will function;

  ↓ banding factor that varies in time

  ↓ ⇒ Decline in investments

  Government: will the target be met?

© 2014, VITO NV

Conclusion

- Both schemes: effective but not cost-efficient however for different reasons
  - Norway-Sweden: due to differences in taxes, depreciation rules

    $\Rightarrow$ Be careful with creating common markets for commodities
  - Flanders: caused by design aspect: minimum allowances above market price
- Certificate scheme design: determine how risks are distributed among the participants
  - Most apparent in Flemish scheme in view of its numerous amendments
- Take care when designing certificate schemes
  - Analysis of commodification and financialisation aspects helps to understand the impacts of its design

© 2014, VITO NV

vito
vision on technology

11/09/2014

Thank you for your attention

Any questions?