



Biofuel policies for dynamic markets

The role of risk-mitigating policies in promoting second generation biofuels

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Presentation overview

- Risk profiles of 1st and 2nd generation biofuels and the cost of capital
- Impact of cost of capital on market penetration rates for 1st and 2nd generation biofuels
- Technology risk of 2nd generation and policy options for overcoming the initial investment barrier
- Policy options and mixes to achieve higher market share of 2nd generation biofuels
- Potential future synergies and threats with other sectors
- Preliminary conclusions
- Analysis limitations

Financing options for biofuel projects

equity debt

Risks related to biofuel projects

- technology risk
- market risks
- regulatory risk
- geopolitical risk
- stakeholder acceptance

Cost of capital (WACC)

2nd generation support policies

soft loan

investment subsidy

financing demonstration plants

Project cash-flow

feedstock costs

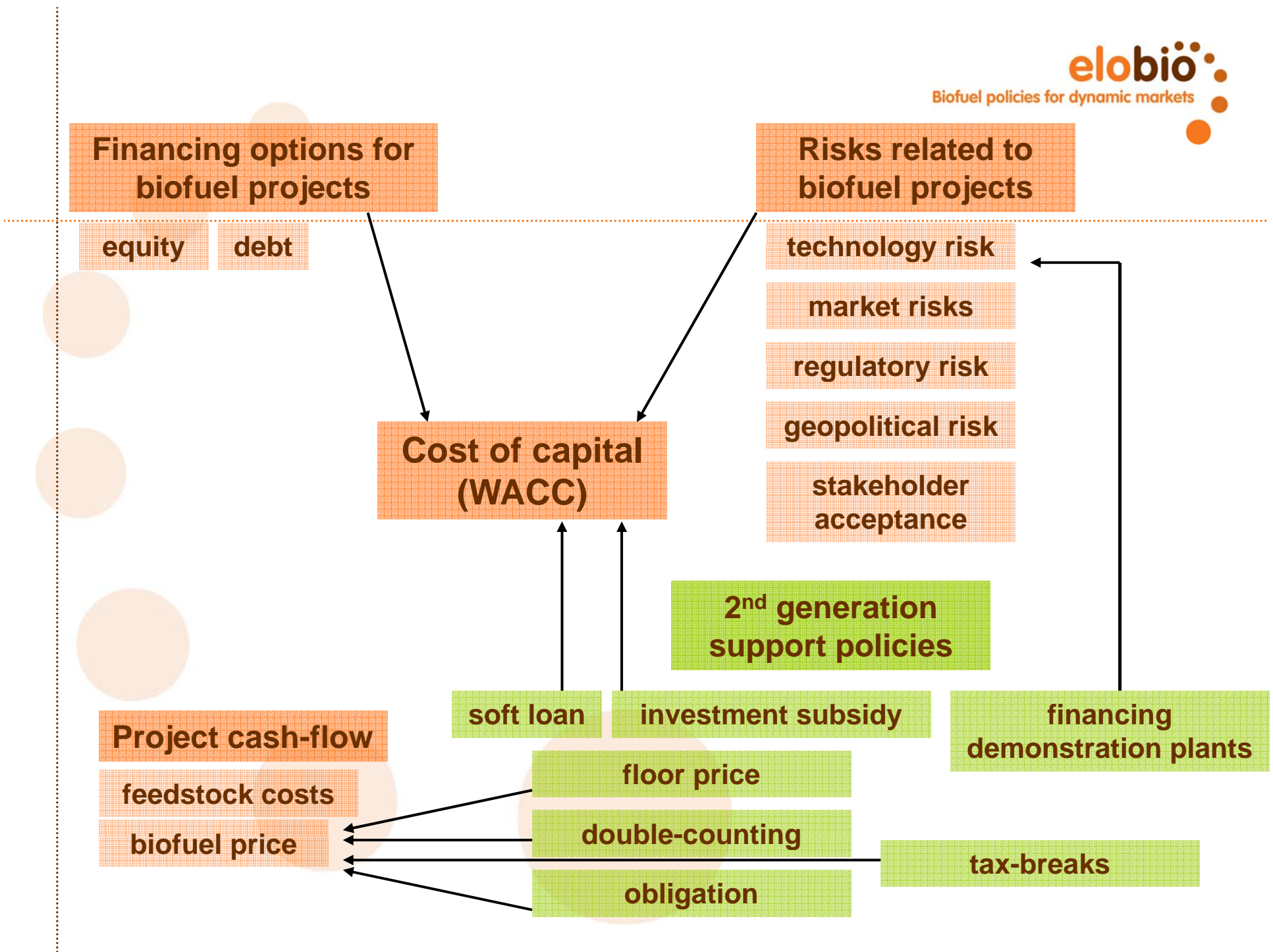
biofuel price

floor price

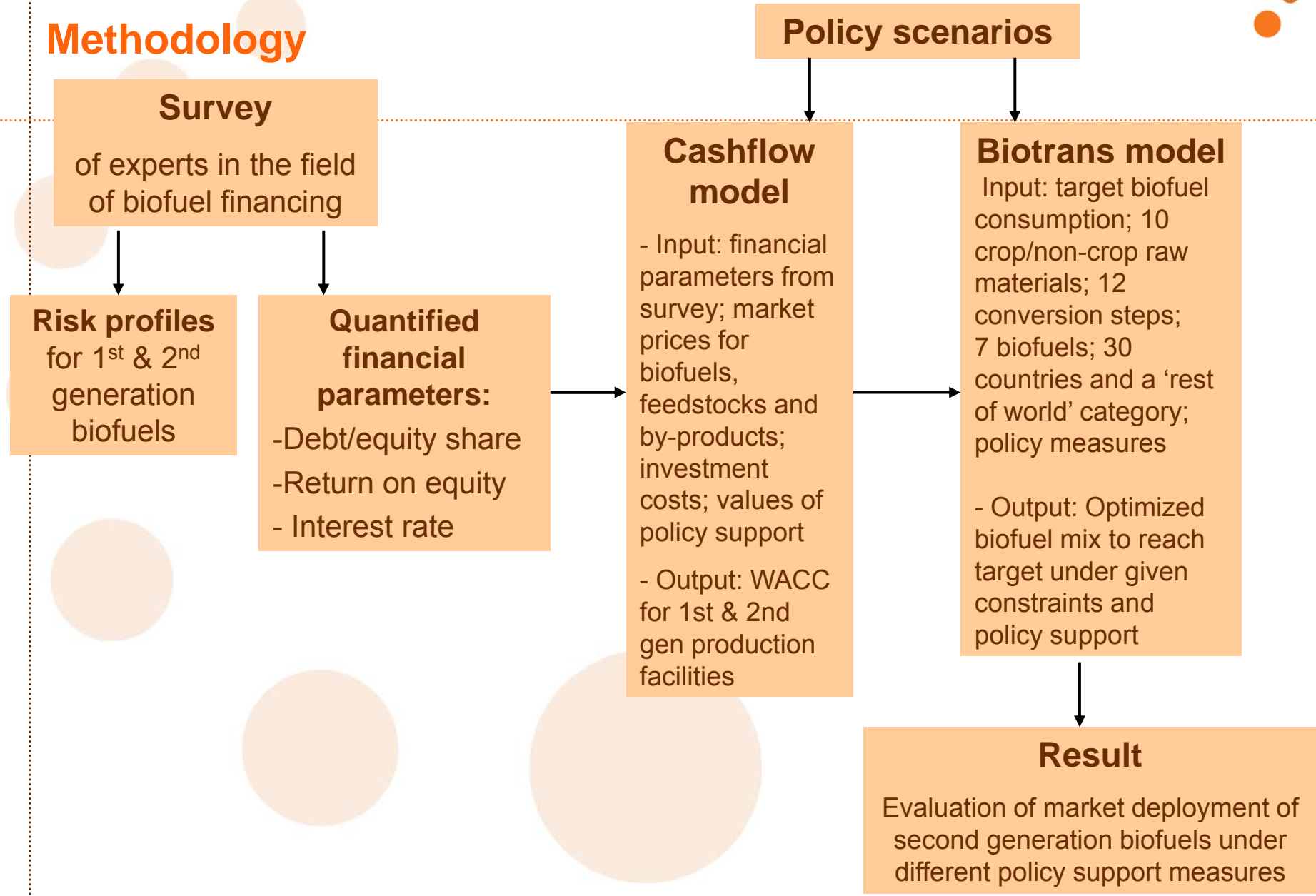
double-counting

obligation

tax-breaks



Methodology



Risks associated to biofuel projects and the related cost of capital

<i>Risk Type</i>	<i>1st generation</i>	<i>2nd generation</i>
Technology risk	Low-medium	High
Market risk	High	Medium
Regulatory/Policy risk	High	Medium
Geopolitical risk	Medium	Low
Stakeholder acceptance	High	Low



FINANCIAL PARAMETERS	1st generation	2nd generation
<i>Short term</i>		
Level of debt financing	50-80%	0%
Level of equity financing	20-50%	100%
Debt-service coverage ratio	1.3-1.8	n.a.
Interest rate	6,5-9%	n.a.
Required return on equity	15-20%	30%
<i>Long term</i>		
Level of debt financing	50-80%	50-80%
Level of equity financing	20-50%	20-50%
Debt-service coverage ratio	1.5	1.5
Interest rate	6-8%	6-8%
Required return on equity	15-20%	15-20%

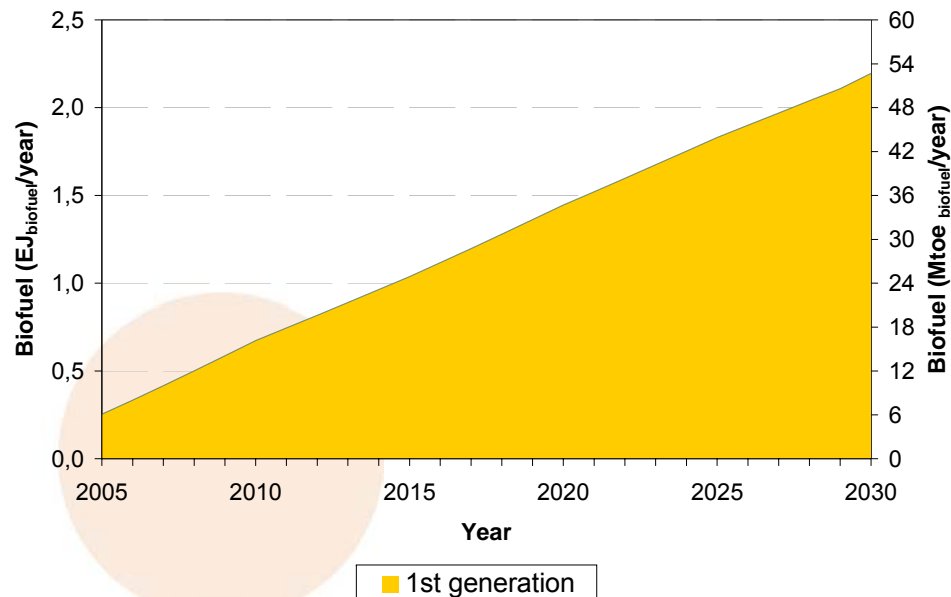
} assumptions

Technology risk makes for a big initial investment barrier

- First generation projects offer much more returns.
- Meeting the high return requirements of ventur capital means a very large price gap – this will diminish as soon as a standard project-finance is attainable.
- After full commercialization, certain 2nd generation conversion routes (e.g. FT diesel), will offer returns just as attractive as 1st generation.

Initially:

No additional support =
no second generation on
the market by 2020, even
in the case of obligation!

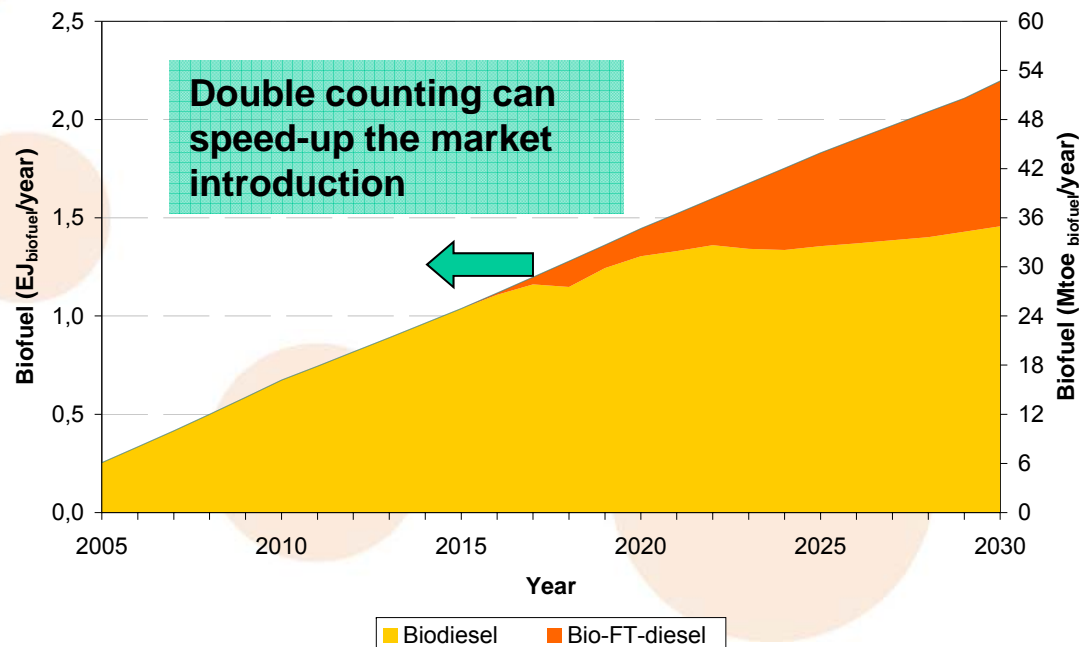


Overcoming the initial investment barrier

Policies tested:

- Tax break for second generation biofuels (full and partial)
- Double counting of second generation
- Initial investment subsidy (50% and more)

Insufficient on its own



High initial investment subsidy:

2nd gen enters the market → technology risk overcome → WACC lowers + learning effects lower technology cost → investment subsidy can be lowered

Towards a higher market share for second generation

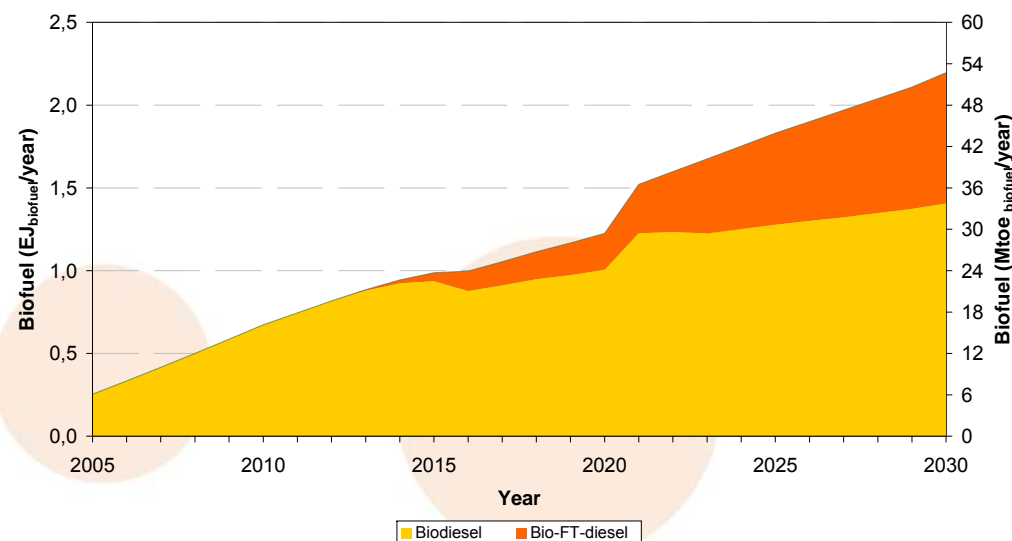
Policy option(s)	Effectiveness (market share of 2nd gen by 2030)	Efficiency (total policy cost in € ₂₀₀₅ /GJ biofuel)
1a: Continuous (high) investment subsidy (>50%)	☺☺☺ (~40%)	☹☹ (~15)
1b: Investment subsidy gradually phased-out	☺☺ (~35%)	☹☹ (~10)
2b: Initial investment subsidy + parallel partial tax break	☺☺☺ (~45%)	☹☹☹ (~20)
2c: Initial (higher) investment subsidy + subsequent partial tax break	☺☺☺ (~45%)	☹☹☹ (~20)
3a: Initial (high) investment subsidy + subsequent soft loan	☺☺ (~35%)	☹ (~5)
3b: Initial (high) subsidy + continuous low subsidy + soft loan	☺☺ (~35%)	☹☹ (~10)
4a: Initial (high) investment subsidy + continuous double counting	☺☺ (~30%)	☺ (~2)
4b: Initial (high) investment subsidy + double counting discontinued after 2020	☺☺ (~35%)	☺ (~1)

Preliminary policy assessment

- Differences in policy costs are very high! The most effective policies are not also the most efficient.
- Double counting (in combination with initial investment subsidy) is the most cost-efficient policy combination for achieving a significant relative market share.

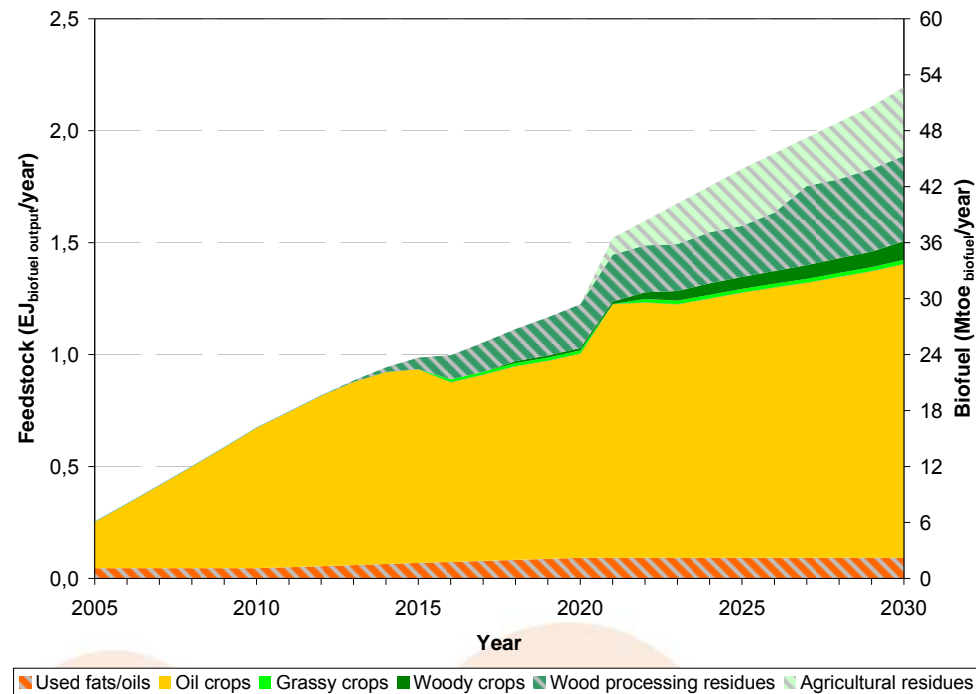
BUT !!!

- Double counting reduces the size of the biofuel market → the absolute value of second generation is lower then in any other case.
- To fulfil its purpose best, double counting must be discontinued after the initial investment hurdle is overcome and learning effects start lowering the cost of the technology.



Potential risk: feedstock provision

Resource base of biofuel mix under high initial investment and discontinued double counting

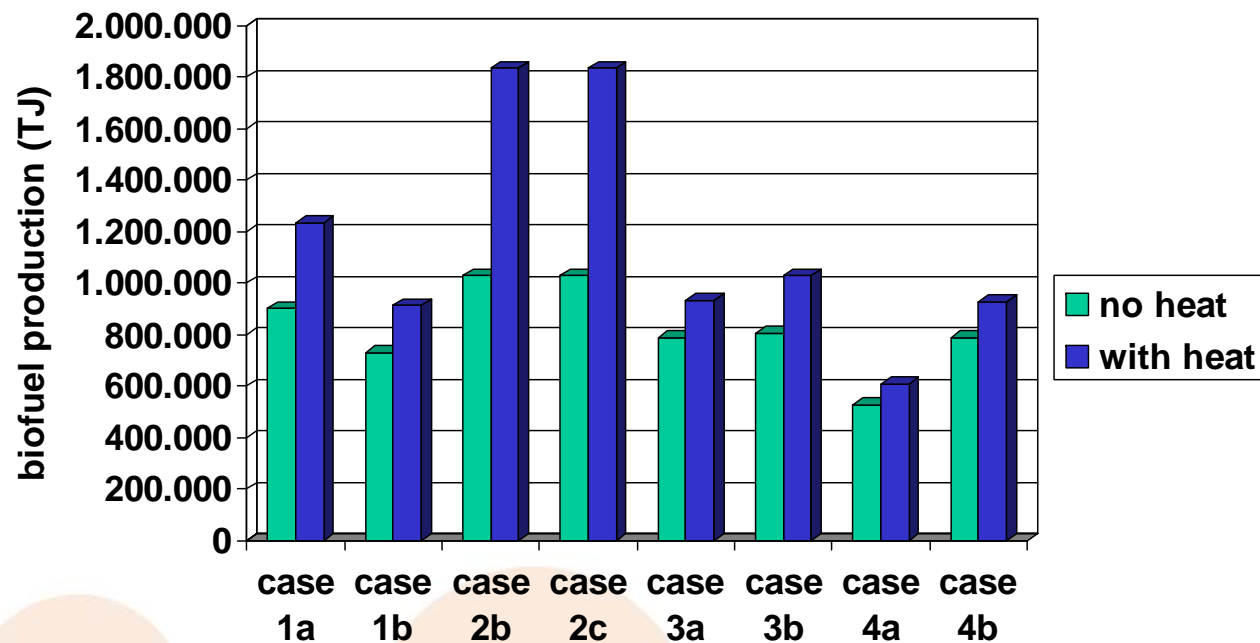


Back of the envelope calculation: 0,5 EJ woody feedstock demand = cca 80 – 100 mio m³

→ Increased competition between forestry-based sectors → possible increase of market risk for 2nd gen installations

Potential opportunity: heat sales

- Heat sales might represent an important additional revenue stream for 2nd gen installation
→lower overall production costs→support production expansion



Heat sales can support further capacity expansion for 2nd gen even as policy support is phased out.

Preliminary conclusions

- The biggest hurdle for second generation is technology risk.
- High level of investment subsidy (+ double counting) is an effective and efficient strategy to overcome the initial investment hurdle.
- After, learning effects and a lower WACC will allow for a gradual phase-out of policy support.
- Double counting serves its purpose best if discontinued after initial market introduction of 2nd generation!
- To avoid policy costs escalating beyond maintainable levels, any support measures given per unit of capacity installed or biofuel produced (and sold), should gradually be discontinued. A support measure “with a deadline” might also increase the sense of urgency with project developers.
- Heat sales can speed up introduction of second generation and most importantly support market expansion while policy support is gradually phased out. However, this is an unlikely option for early installations or at least until technological performance is well-established.
- Feedstock market risk might become a real issue for second generation as capacity expands and feedstock demand increases for already supply-constrained woody residues & woody crops.

Limitations

- Still small data sample.
- Model assumes unrestricted capital supply for projects meeting the WACC requirements.
- Assumptions on commercialization timeline for 2nd generation matters (but not that much!)
- Projects implemented through corporate finance not accounted for.
- Somewhat arbitrary decision on the cut-off date for investment subsidies and full commercialization.
- Learning effects achieved by projects finance through corporate finance not accounted for.

THANK YOU FOR YOUR ATTENTION



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