



DYNAMIX

Decoupling growth from resource use
and its environmental impacts

<http://dynamix-project.eu/>

Aiming for absolute decoupling in Europe: modeling results

Andrea Bigano and Francesco Bosello on behalf of the
DYNAMIX modelling team

Joint Final DYNAMIX & POLFREE Conference
15/16 February 2016



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 308674.



DYNAMIX

Decoupling growth from resource use
and its environmental impacts

Apply a set of different and complementary modelling tools to integrate Dynamix qualitative findings with quantitative evidence on the cost and effectiveness of the policy mixes discussed.

Joint Final DYNAMIX & POLFREE Conference



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 308674.



DYNAMIX

Decoupling growth from resource use
and its environmental impacts

THE DYNAMIX MODELLING TOOLBOX

MODEL	Type	Geographic detail	Sectoral detail	Tech. Progress	Type of dynamics	Labour Market
ICES	Global CGE model	EU at the member state	20	Exogenous	Myopic (backward looking)	Fully competitive
MEMO	Dynamic stochastic CGE model	EU aggregated	10	Endogenous	Full (forward looking)	Imperfect
MEWA	Dynamic stochastic CGE model	EU aggregated	15	Endogenous	Full (forward looking)	Imperfect
ILCD	Material LCA	EU aggregated	13	--	--	--

Joint Final DYNAMIX & POLFREE Conference



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 308674.



DYNAMIX

Decoupling growth from resource use
and its environmental impacts

THE POLICY AND MODELLING MATRIX (SELECTION)

Policy mix	Policy fiche	ICES	MEMO II	MEWA	ILCD
Metals and Other Materials (MOM)	Materials tax	X	X	X	x
	Internalisation of external environmental costs		X	X	
	Increased spending on research and development			X	
Land-Use (LU)	Strengthened pesticide reduction targets under the Pesticides Directive	X		X	X
	Targeted information campaign to influence food behaviour towards changing diets	X			X
	VAT on meat	X	X	X	x
Overarching (O)	“Circular economy tax trio”	X	X	X	
	Enabling shift from consumption to leisure			X	



DYNAMIX

Decoupling growth from resource use
and its environmental impacts

IMPLEMENTING THE POLICIES

Policy fiche	What	How much	When
Materials tax	ICES: Sales tax of wood and mining to all other sectors (excluding fossil fuel extraction) + Sales tax of Oil Products to Chemicals. MEMO II and MEWA: Sales tax of wood, fuels, metal and other to all manufacturing sectors and construction + sales tax of chemical, metal and non-metallic mineral (excluding tax they pay for raw material purchase) to manufacturing and construction sector + MEMO II: 50% recycling to reduce labour taxation MEWA: a) 100% recycling to reduce labour taxation, firms cannot pursue material efficiency improvements; b) decrease in labour taxation, firms can pursue material efficiency improvements; c) decrease in labour taxation and support to R&D in material efficiency.	3 pp/year (up to 30%) 8.5 pp/year (up to 200%)	2021-2030 2031-2050
Internalisation of external environmental costs	Excise tax on all sectors, but services a) common flat tax rate to all sectors; b) sector specific rate based on actual externalities MEMO II 50% recycling to reduce labour taxation MEWA 100% recycling to reduce labour taxation	linear increase up to 35%	2030-2050
Strengthened pesticide reduction targets under the Pesticides Directive	Tax on domestic and imported sales of chemicals to the agriculture sector	8% linear increase up to 20%	2020-2050
VAT on meat	Fill the gap between current VAT on meat and the average country-specific/EU VAT	13 pp (EU average, in ICES country-specific)	2020 (kept constant up to 2050)
Circular economy tax trio	ICES and MEMO II: Tax on domestic sales of mining (excluding fossil fuels) to non-metallic minerals and construction + Tax on exports of non-metallic minerals. MEWA: Tax on virgin materials, landfills and waste incineration	38% linear increase up to 50%	2018-2050

Joint Final DYNAMIX & POLFREE Conference



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 308674.

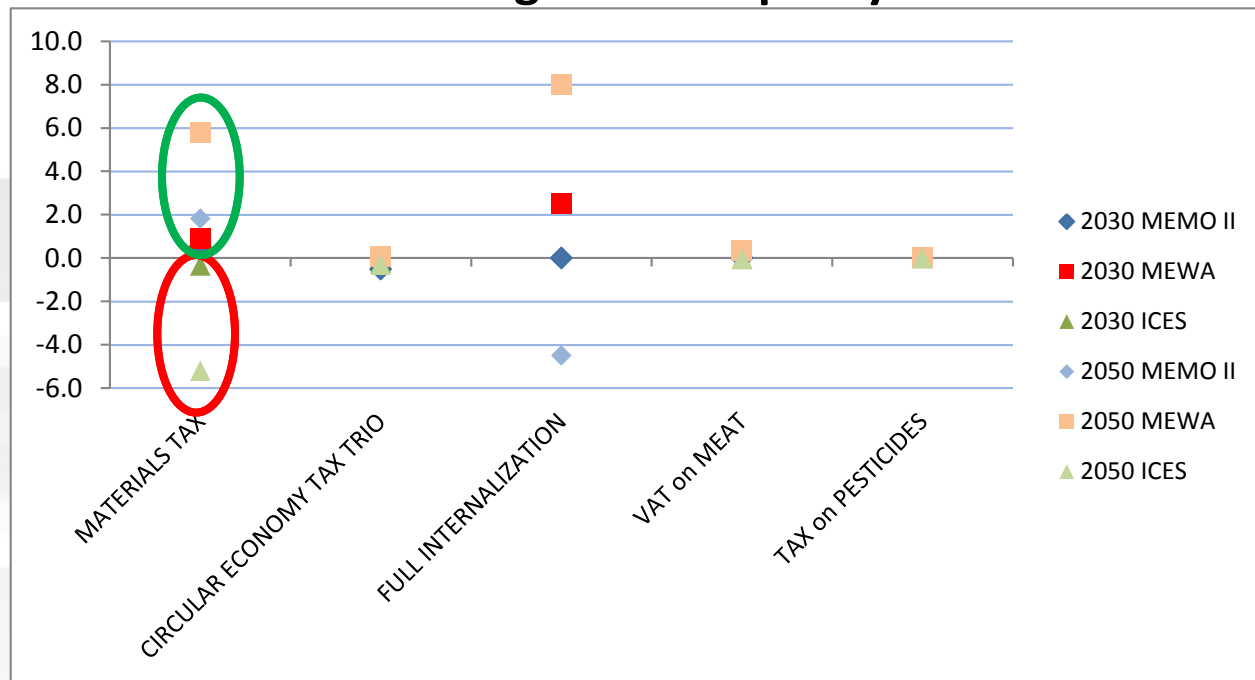


DYNAMIX

Decoupling growth from resource use
and its environmental impacts

THE GDP COST OF THE POLICIES

EU: % changes wrt no policy case



With cut in
labour taxes and
endogenous TP

With lump-sum
rebates and
exogenous TP

«dematerialization
policies»

«Land-use policies»

Joint Final DYNAMIX & POLFREE Conference



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 308674.

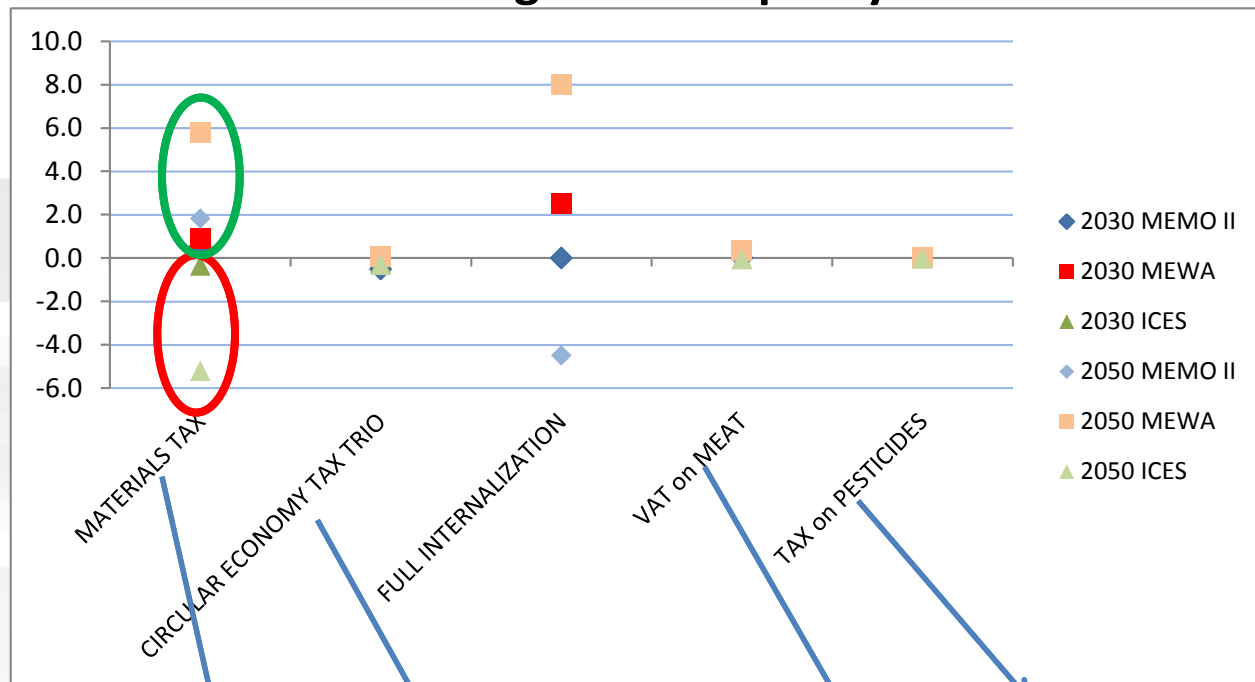


DYNAMIX

Decoupling growth from resource use
and its environmental impacts

THE GDP COST OF THE POLICIES

EU: % changes wrt no policy case



With cut in
labour taxes and
endogenous TP

With lump-sum
rebates and
exogenous TP

Worst off country in
2050 (ICES)

-22%
Finland

-1.47%
Czech.Rep.

--

-0.21%
Poland

-0.35%
Austria

Joint Final DYNAMIX & POLFREE Conference



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 308674.

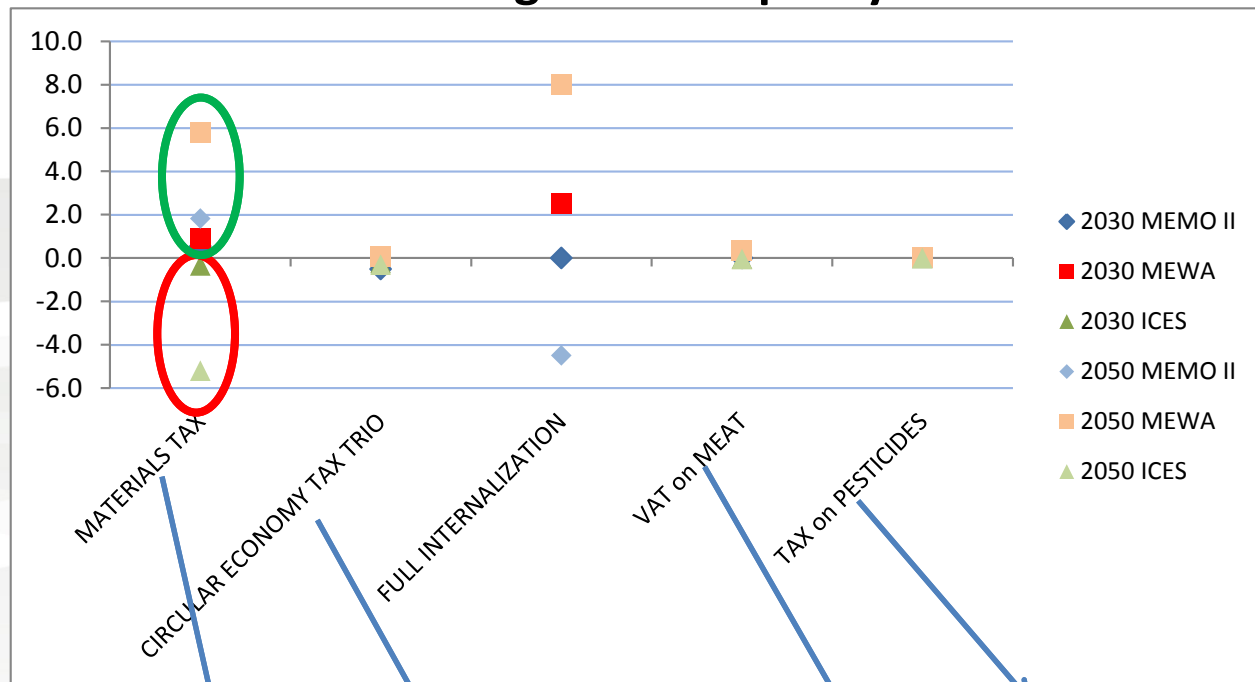


DYNAMIX

Decoupling growth from resource use
and its environmental impacts

THE GDP COST OF THE POLICIES

EU: % changes wrt no policy case



With cut in
labour taxes and
endogenous TP

With lump-sum
rebates and
exogenous TP

**GDP RoW in 2050
(ICES) % change wrt no
policy case**

+ 0.72%

+ 0.04%

--

+ 0.01%

- 0.0024

**GDP BRICS in 2050
(ICES) % change wrt no
policy case**

+ 0.76%

+ 0.04%

--

+ 0.01%

- 0.0041

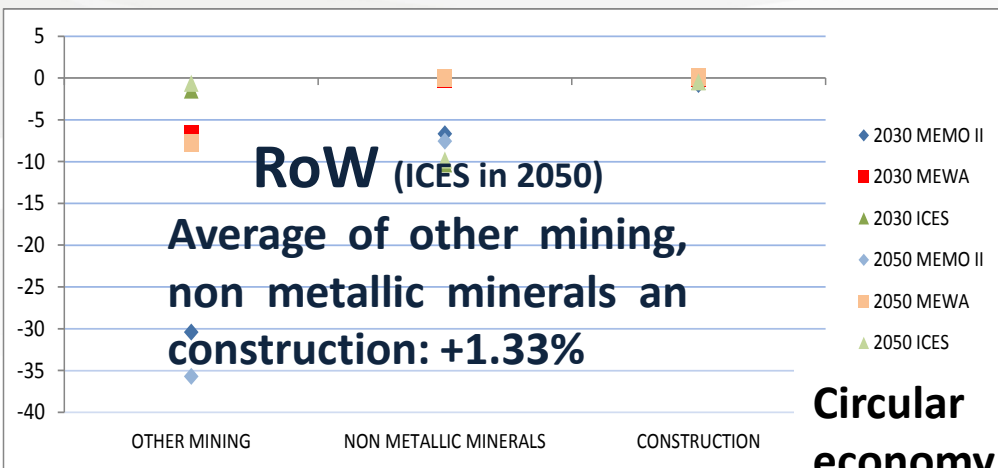
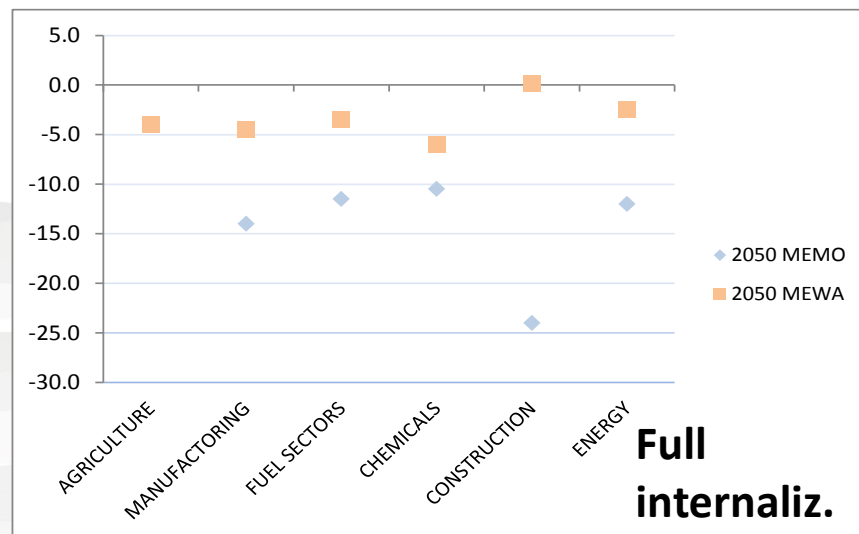
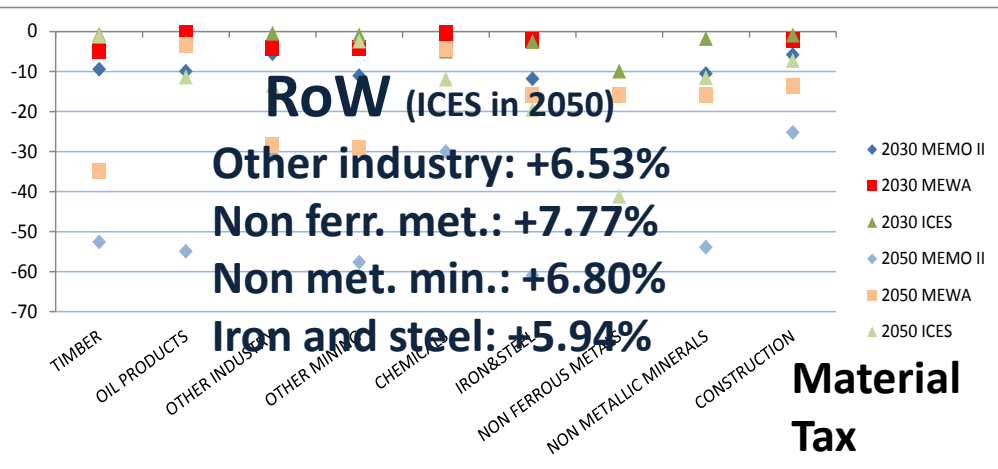
This project has received funding from the
European Union's Seventh Framework Programme
for research, technological development and
demonstration under grant agreement no 308674.



DYNAMIX

Decoupling growth from resource use
and its environmental impacts

DE-MAT. POLICY EFFECTIVENESS: PRODUCTION



EU: % changes wrt no policy case

In ICES tax revenues are rebated lump-sum to households, in MEMO II they are 50% recycled through cut in labour taxes; in MEWA they are 100% recycled through cut in labour taxes.

Joint Final DYNAMIX & POLFREE Conf



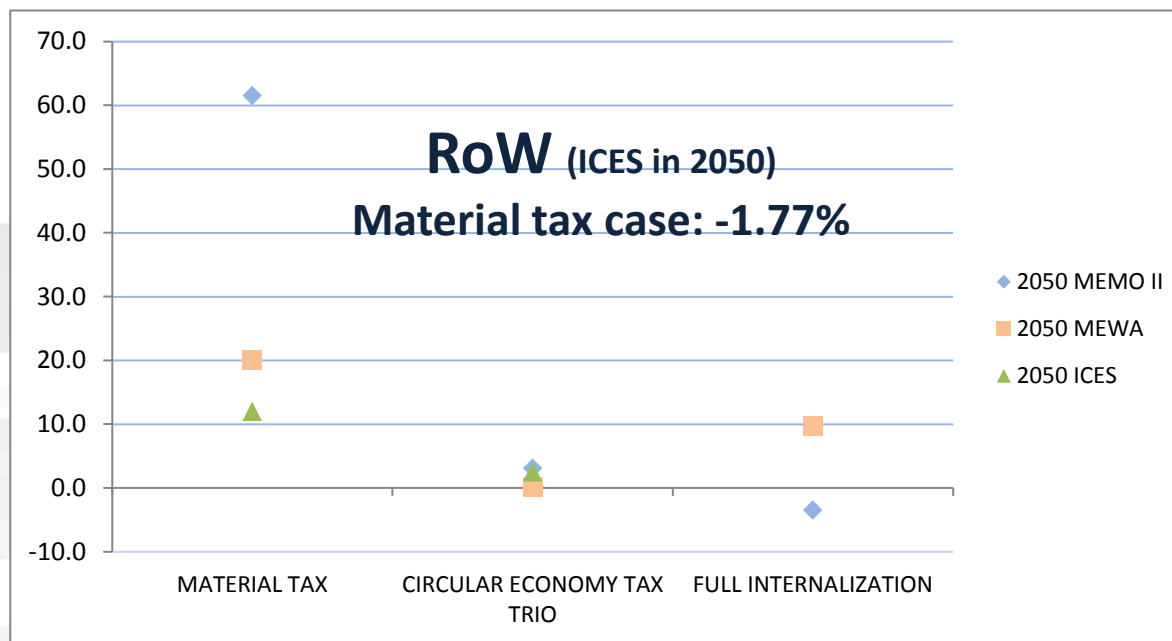
This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 308674.



DYNAMIX

Decoupling growth from resource use
and its environmental impacts

DE-MAT. POLICY EFFECTIVENESS: MATERIAL “EFFICIENCY”



EU: % changes wrt no policy baseline.

Material efficiency expressed in MEMO II as (value of) output/material inputs; ICES and MEWA as improvement in the GDP/material input ratio.

In ICES tax revenues are rebated lump-sum to households, in MEMO II they are 50% recycled through cut in labour taxes; in MEWA they are 100% recycled through cut in labour taxes.

Joint Final DYNAMIX & POLFREE Conference



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 308674.

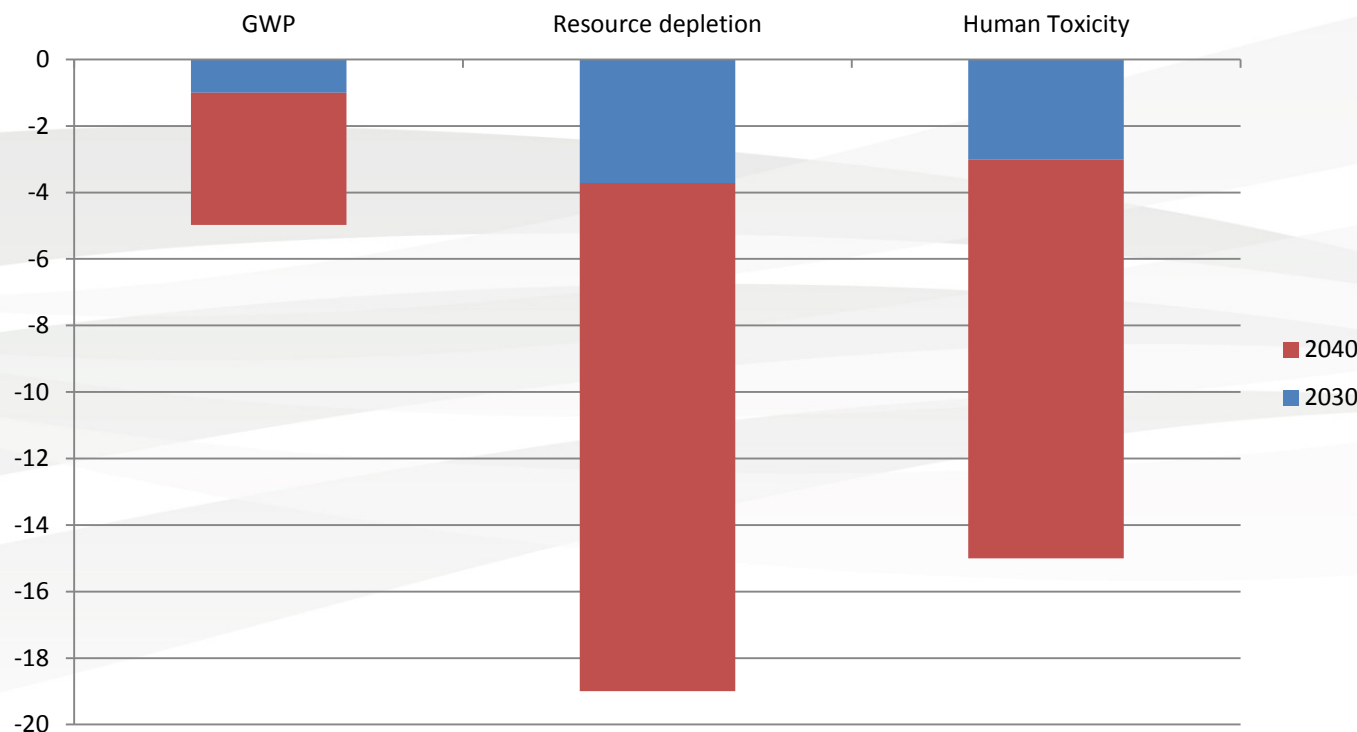


DYNAMIX

Decoupling growth from resource use
and its environmental impacts

DE-MAT. POLICY EFFECTIVENESS: INSIGHTS FROM LCA

EU: % changes wrt no policy baseline.



Embedding output from the ICES model into LCD model

Joint Final DYNAMIX & POLFREE Conference



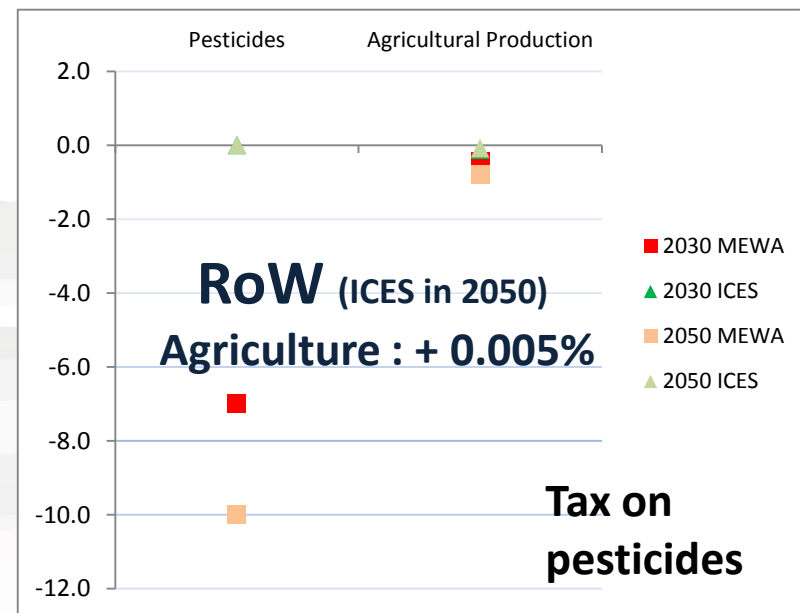
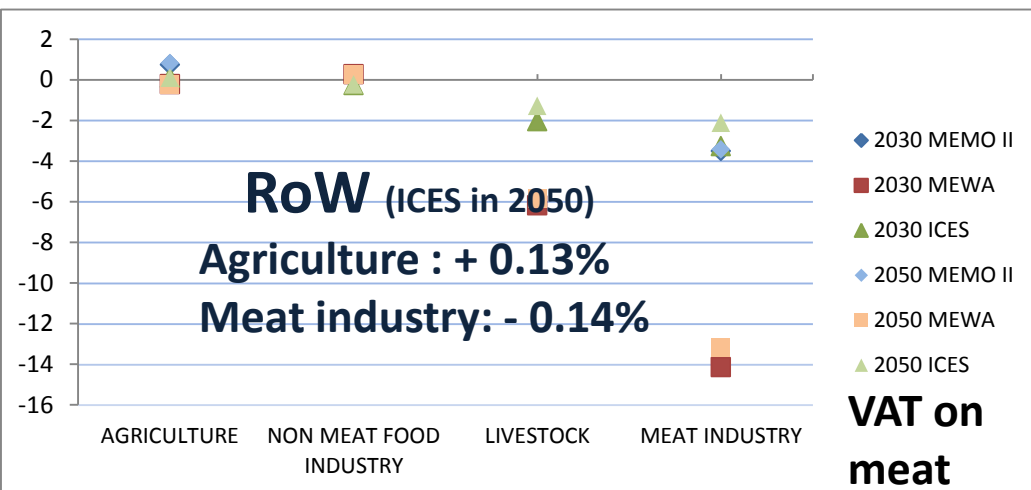
This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 308674.



DYNAMIX

Decoupling growth from resource use
and its environmental impacts

LAND-USE POLICY EFFECTIVENESS: PRODUCTION



EU: % changes wrt no policy case

In ICES and MEMO II tax revenues are rebated lump-sum to households; in MEWA they are 100% recycled through cut in labour taxes.

Joint Final DYNAMIX & POLFREE Conference



This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no 308674.



CONCLUSIONS

Successful dematerialization faces some fundamental challenges:

- Implemented through material pricing (taxation) it can exert important depressing effect on growth. A proper use of revenues is thus crucial.
- Substantive technological advancements are also needed to avoid booming in policy costs. Policies should be designed to stimulate technological progress
- Effectiveness in the EU does not guarantee undesired effects outside the EU (economic «leakages» and increased materialization). International coordination needed.
- Some policies (e.g. on pesticides, on virgin materials, meat) address relatively «narrow» sectors in economic terms, have thus mainly a sectoral relevance, but not «systemic» effects.

Joint Final DYNAMIX & POLFREE Conference