



Scanning Policy Scenarios for the Transition to Sustainable Economic Structures www.TranSust.org

TransSust.Scan Working Paper

Task 1: Model Extension

Leader: ZEW

Task 1: Model Extensions

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In the TranSust.Scan project, workpackage 1, task 1 defines the following main activities for the participating modelling groups:

- . The increase of the range of indicators covered by the various models either by systematic (complementary) inter-linkages or by straightforward specific model extensions.
- . The matching of input variables as a prerequisite for joint model application for forecasting, simulation, and backcasting.

For the interim report, the task leader ZEW sent out a questionnaire to ask all groups for the progress on task 1. In the sections below, the answers are presented for the following models:

MODEL	GROUP
DART	IfW, Kiel
DEMETER	IVM-VU, Amsterdam
EU-FASOM	University of Hamburg
GAIN	WIFO, Vienna
ICES	FEEM, Milano
IMACLIM	SMASH-CIRED, Paris
IMPEC	LIFEA, Lodz
KLUM	University of Hamburg
MARKAL	ECN
РАСЕ	ZEW, Mannheim
WITCH	FEEM, Milano
W8D	LIFEA, Lodz

Name of the model: DART (Dynamic Applied Regional Trade)

Name of institution: Kiel Institute for the World Economy

A list of standard variable and indicator extensions follows on the next pages.

 Are there extensions of your model by variables or indicators beyond the ones in the list? Please write them down.

We are working on including non-CO2 GHG emissions.

2. Describe all variable extensions in words. What is the value added by them?

There are not currently any existing variable extensions. We will start though in this year to extend the model to include land-use changes in Germany and Europe and renewable energy. The goal is to analyze the role of bio-energy in an optimal energy mix.

3. Describe all indicator extensions in words. What is the value added by them?

We have added different definitions of the "Revealed comparative Advantage" Indicator that allows us to assess the international competitiveness effects of different policy analysis taking into account disaggregated changes in sectoral imports and exports.

4. To what extend do the extensions prepare your model for Integrated Assessment?

The planned addition of land-use changes will be achieved by coupling a GIS based land-use model for Germany to an extended version of DART.

Theme	Sub-theme		Areas to be addressed	RANSUST	XTENSION
Economic development	Investment	1.	Investment in R&D		-12-
Economic development		2.	Investment in Env. Friendly technologies		
		3.	Consumption and inflation		
		4.	Saving and borrowing		
	Competitiveness	5.	Labour productivity	X	
		<u>6.</u> 7.	Unit labour costs Life-long Learning	Х	
	Employment	8.	Employment rate		
	Linployment	9.	Unemployment rate		
D	Manatan				
Poverty and social exclusion	Monetary poverty	10.	Income inequality Non-monetary deprivation		
exclusion	Access to Labour Market	12.	Poverty-in-work		
			Access to education		
	Other aspect of social exclusion	14.	Access to health care		
		15.	Access to housing		
		16.	Social participation		
Aging Society	Pensions adequacy	17.	Income of elder generations		
	Demographic changes	18.	Life expectancy		
		<u>19.</u> 20.	Fertility Migrations		
	Financial Sustainability	20.	Age of withdrawal from Labour Market		
	T manetar Sustainability	22.	Pension expenditures		
Public health	Human health protection and Life		Financial sustainability		
	styles	24.	Disability-free life expectancy		
	-	25.			
		26	Life styles		
		27.	Health and safety at work		
		28.	Infectious diseases and resistance to antibiotics		
	Food Safety and Quality	<u>29.</u> 30.	Pesticide residues Microbiological contamination		
			Drinking water quality		
	Chemicals management	32.	Chemicals production and consumption		
		33.	Exposure to chemicals		
	Health risks due to environmental	34.	Air quality		
	conditions	35.	Noise exposure		
Climate change and	Climate change	36.	GHG emission reduction	Х	
energy	Energy	37.	Energy taxes	Х	
		38.	Energy efficiency	Х	(V/*)
		<u>39.</u> 40.	Renewable energy resources Management of nuclear waste		(X*)
		40.	Air pollution from energy use		
	Eco-efficiency	42.	Decoupling economic growth and resource use		
Production and	Leo enterency	43.	Decoupling economic growth and emissions	Х	
consumption patterns		44.	Decoupling economic growth and generation of wastes		
	Agriculture	45.	Pesticides use		
		46.	Nitragen helenees		
			Nitrogen balances		
		47.	Environmentally-friendly farming		
	Corporate responsibility	48.	Environmentally-friendly farming Triple bottom line		
	Consumer awareness	48. 49.	Environmentally-friendly farming Triple bottom line Consumer information		
Management of natural	Consumer awareness	48. 49. 50.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity		
Management of natural resources	Consumer awareness Biodiversity	48. 49. 50. 51.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity		
	Consumer awareness Biodiversity Marine ecosystems	48. 49. 50. 51. 52.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing		
	Consumer awareness Biodiversity	48. 49. 50. 51.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity		
	Consumer awareness Biodiversity Marine ecosystems	48. 49. 50. 51. 52. 53.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use		(X*)
	Consumer awareness Biodiversity Marine ecosystems Fresh water resources	48. 49. 50. 51. 52. 53. 54.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources		(X*)
resources	Consumer awareness Biodiversity Marine ecosystems Fresh water resources	48. 49. 50. 51. 52. 53. 54. 55.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources Land use change		(X*)
	Consumer awareness Biodiversity Marine ecosystems Fresh water resources	48. 49. 50. 51. 52. 53. 54. 55. 55. 56. 57. 58.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth		(X*)
resources	Consumer awareness Biodiversity Marine ecosystems Fresh water resources Land use	48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport		(X*)
resources	Consumer awareness Biodiversity Marine ecosystems Fresh water resources Land use Transport growth	48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth		(X*)
resources	Consumer awareness Biodiversity Marine ecosystems Fresh water resources Land use Transport growth Environmental impact of	48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport		(X*)
Transport	Consumer awareness Biodiversity Marine ecosystems Fresh water resources Land use Transport growth Environmental impact of transport activities	48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants		(X*)
resources	Consumer awareness Biodiversity Marine ecosystems Fresh water resources Land use Transport growth Environmental impact of	48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions		(X*)
Transport	Consumer awareness Biodiversity Marine ecosystems Fresh water resources Land use Transport growth Environmental impact of transport activities	48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures		(X*)
Transport	Consumer awareness Biodiversity Marine ecosystems Fresh water resources Land use Transport growth Environmental impact of transport activities Policy coherence	48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions		(X*)
resources Transport Good governance	Consumer awareness Biodiversity Marine ecosystems Fresh water resources Land use Transport growth Environmental impact of transport activities Policy coherence Public participation	48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures Legislative compliance Communication and mobilization		(X*)
Transport	Consumer awareness Biodiversity Marine ecosystems Fresh water resources Land use Transport growth Environmental impact of transport activities Policy coherence	48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures Legislative compliance		(X*)
resources Transport Good governance	Consumer awareness Biodiversity Marine ecosystems Fresh water resources Land use Transport growth Environmental impact of transport activities Policy coherence Public participation Globalisation of trade	48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 60. 61. 62. 63. 64. 65. 66.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures Legislative compliance Communication and mobilization Market access for least developed countries (LDC) Foreign direct investments to developing countries Official Development Assistance (ODA)		(X*)
resources Transport Good governance	Consumer awareness Biodiversity Marine ecosystems Fresh water resources Land use Transport growth Environmental impact of transport activities Policy coherence Public participation Globalisation of trade Financing for SD	48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures Legislative compliance Communication and mobilization Market access for least developed countries Official Development Assistance (ODA) Other official financing		(X*)
resources Transport Good governance	Consumer awareness Biodiversity Marine ecosystems Fresh water resources Land use Transport growth Environmental impact of transport activities Policy coherence Public participation Globalisation of trade	48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 67. 68. 69. 70.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures Legislative compliance Communication and mobilization Market access for least developed countries (LDC) Foreign direct investments to developing countries Official Development Assistance (ODA) Other official financing Resource consumption		(X*)
resources Transport Good governance	Consumer awareness Biodiversity Marine ecosystems Fresh water resources Land use Transport growth Environmental impact of transport activities Policy coherence Public participation Globalisation of trade Financing for SD	48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69.	Environmentally-friendly farming Triple bottom line Consumer information Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity Over-fishing Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures Legislative compliance Communication and mobilization Market access for least developed countries Official Development Assistance (ODA) Other official financing		(X*)

EC	Indicator	TRANSUST	EXTENSIONS
I.	GDP per capita	Χ	
II.	Labor productivity	Χ	
III.	Employment rate		
IV.	Employment rate of older workers		
V.	Spending on human resources (public exp. on education)		
VI.	Research and Development expenditure		
VII.	Information Technology expenditure		
VIII.	Financial market integration (conv. of bank lending rates)		
IX.	At risk-of-poverty rate		
Χ.	Long-term unemployment		
XI.	Dispersion of regional employment rates		
XII.	Greenhouse gases emissions	Х	
XIII.	Energy intensity of the economy	Х	
XIV.	Volume of transport		
XV.	Competitiveness		X

Name of the model: DEMETER

Name of institution: Institute for environmental Studies, Vrije Universiteit Amsterdam (IVM-VU), in collaboration with ECN

A list of standard variable and indicator extensions follows on the next pages.

 Are there extensions of your model by variables or indicators beyond the ones in the list? Please write them down.

The Carbon Capture and Storage (CCS) technology is added, as well as geological CO2 leakage.

2. Describe all variable extensions in words. What is the value added by them?

Carbon Capture and Storage is likely to be an essential element in the transition towards sustainable energy use, and as proven in the analysis, it will have a substantial impact on the development of non-carbon energy, though this depends on the degree of leakage associated with the CCS technology.

- 3. Describe all indicator extensions in words. What is the value added by them?
- 4. To what extend do the extensions prepare your model for Integrated Assessment?

The extension provides a more detailed insight in the transition towards sustainable energy use, and thus prepare for a careful analysis of IA.

Theme	Sub-theme		Areas to be addressed	TRANSUST	
Economic development	Investment	1.	Investment in R&D		
Leononne development		2.	Investment in Env. Friendly technologies	Х	
		<u>3.</u> 4.	Consumption and inflation Saving and borrowing	X	
	Competitiveness	4. 5.	Labour productivity	X	
	competitiveness	6.	Unit labour costs		
		7.	Life-long Learning		
	Employment	8.	Employment rate		
		9.	Unemployment rate		
Poverty and social	Monetary poverty	10.	Income inequality		
exclusion		11.	Non-monetary deprivation		
	Access to Labour Market	12.	Poverty-in-work		
	Other aspect of social exclusion	13.			
		14.			_
		15. 16.	5		-
Aging Society	Pensions adequacy	17.			-
Aging Society	Demographic changes	18.	Life expectancy		
		19.			1
		20.	Migrations		t
	Financial Sustainability	21.	Age of withdrawal from Labour Market		
		22.	Pension expenditures		
Public health	Human health protection and Life	23.			
	styles	24.			1
		25.	Premature mortality		_
		26 27.	Life styles Health and safety at work		-
		27.	Infectious diseases and resistance to antibiotics		-
	Food Safety and Quality	29.	Pesticide residues		-
		30.	Microbiological contamination		
		31.	Drinking water quality		
	Chemicals management	32.	Chemicals production and consumption		
		33.	Exposure to chemicals		
	Health risks due to environmental conditions	<u>34.</u> 35.	Air quality Noise exposure		_
Climata ahanga and		36.	GHG emission reduction	Х	-
Climate change and energy	Climate change Energy	30.		X	-
energy	Energy	38.	Energy efficiency	X	-
		39.	Renewable energy resources	Х	
		40.	Management of nuclear waste		
		41.	Air pollution from energy use		
Production and	Eco-efficiency	42.	Decoupling economic growth and resource use		
consumption patterns		43.	Decoupling economic growth and emissions	Х	
1 1	I/	44.	Decoupling economic growth and generation of wastes		_
	Agriculture	45.	Pesticides use Nitrogen balances		_
		46.	Environmentally-friendly farming		
	Corporate responsibility	48.	Triple bottom line		
	Consumer awareness	49.	Consumer information		
Management of natural		50.	Protection of habitats and natural systems and biodiversity		
resources		51.	Maintaining the carrying capacity		L
	Marine ecosystems	52.	Over-fishing		Γ
	Fresh water resources	53.			L
	<u> </u>	54.	Protection of surface and ground water resources		
	Land use	55.	Land use change		1
		56. 57.	Soil degradation Forests		-
Transport	Transport growth	57.	Decoupling of economic and transport growth		-
ransport	riansport growin	<u>58.</u> 59.	Road to rail, water and public transport		+
		60.	Land use by transport systems		+
	Environmental impact of				1
	transport activities	01.	Air pollutants		
Good governance	Policy coherence	62.	Citizen's adherence and support to EU actions		
		63.	Sustainability of EU actions and measures		
	Dellis menti i di	64.	Legislative compliance		_
	Public participation	65.			
Global partnership	Globalisation of trade	66.	Market access for least developed countries (LDC)		1
	Financing for SD	67.	ë 1 ë		1
		68. 69.	Official Development Assistance (ODA) Other official financing		-
			Resource consumption		-
	Resource management			1	1
	Resource management	70.			1
	Resource management	70.	Air emissions & Energy Water		

EC	Indicator	TRANSUST	EXTENSIONS
I.	GDP per capita	X	
II.	Labor productivity	Χ	
III.	Employment rate		
IV.	Employment rate of older workers		
V.	Spending on human resources (public exp. on education)		
VI.	Research and Development expenditure		
VII.	Information Technology expenditure		
VIII.	Financial market integration (conv. of bank lending rates)		
IX.	At risk-of-poverty rate		
Х.	Long-term unemployment		
XI.	Dispersion of regional employment rates		
XII.	Greenhouse gases emissions	X	
XIII.	Energy intensity of the economy	X	
XIV.	Volume of transport		
XV.	Competitiveness		

Name of the model: EU-FASOM

Name of institution: University of Hamburg

A list of standard variable and indicator extensions follows on the next pages.

Note that the model was not part of the original TranSust model set. Therefore no comparison is possible.

- Are there extensions of your model by variables or indicators beyond the ones in the list? Please write them down.
- 2. Describe all variable extensions in words. What is the value added by them?

EU-FASOM is a partial equilibrium model of the European forestry and agricultural sectors. It is going to be extended to cover biofuel production opportunities and their influence on GHG emission levels. This way it is possible to assess questions of land use allocation and development of commodity availability in scenarios of growing importance of biofuels as a possible alternative energy source.

- 3. Describe all indicator extensions in words. What is the value added by them?
- 4. To what extent do the extensions prepare your model for Integrated Assessment?

EU-FASOM is applied to assess the consequences of changing technology, resources, markets and policies on the agricultural and forestry sectors. While this can already be done with the standalone version of EU-FASOM, it is also possible to link it to other models in an integrated assessment framework. The addition of biofuels to the model does not have any structural implications on the model.

Theme	Sub-theme		Areas to be addressed	TRANSUST	
Economic development	Investment	1.	Investment in R&D		L
Economic development		2.	Investment in Env. Friendly technologies		
		3.	Consumption and inflation		
	Commetition	4.	Saving and borrowing		_
	Competitiveness	<u>5.</u> 6.	Labour productivity Unit labour costs		
		7.	Life-long Learning		
	Employment	8.	Employment rate		
	r	9.	Unemployment rate		
Poverty and social	Monotomy novients	10.	Income inequality		-
exclusion	Monetary poverty	11.	Non-monetary deprivation		-
eneration	Access to Labour Market	12.	Poverty-in-work		
		13.			
	Other aspect of social exclusion	14.	Access to health care		
		15.			
		16.	Social participation		
Aging Society	Pensions adequacy	17.	Income of elder generations		
	Demographic changes	18.	Life expectancy		
		19.	Fertility		1
		20.	Migrations		1
	Financial Sustainability	21.	Age of withdrawal from Labour Market		-
Dahla La 14	Hammen handel of the second	22.	Pension expenditures		-
Public health	Human health protection and Life	23.			-
	styles	24.			+
		25. 26			+
		27.	Health and safety at work		
		28.	Infectious diseases and resistance to antibiotics		
	Food Safety and Quality	29.	Pesticide residues		
		30.	Microbiological contamination		
		31.	Drinking water quality		
	Chemicals management	32.	Chemicals production and consumption		
	-	33.	Exposure to chemicals		
	Health risks due to environmental	34.	Air quality		
	conditions	35.	Noise exposure		
Climate change and	Climate change	36.	GHG emission reduction		
energy	Energy	37.			
		38.	Energy efficiency		
		39.	Renewable energy resources		
		40.	Management of nuclear waste		
		41.	Air pollution from energy use		
Production and	Eco-efficiency	42.	Decoupling economic growth and resource use		
consumption patterns		43.	Decoupling economic growth and emissions		_
	A 1.	44.	Decoupling economic growth and generation of wastes		_
	Agriculture	45.	Pesticides use		_
		46.	Nitrogen balances Environmentally-friendly farming		-
	Corporate responsibility	47.	Triple bottom line		-
	Consumer awareness	49.	Consumer information		
Management of natural		50.	Protection of habitats and natural systems and biodiversity		
resources	2.5diversity	51.	Maintaining the carrying capacity		+
	Marine ecosystems	52.	Over-fishing		\vdash
	Fresh water resources	53.	Water extraction and use		Х
	_	54.	Protection of surface and ground water resources		Х
	Land use	55.			Х
		56.	Soil degradation		Х
		57.	Forests		Х
Transport	Transport growth	58.	Decoupling of economic and transport growth		
		59.	Road to rail, water and public transport		
		60.	Land use by transport systems		1
	Environmental impact of	61.	Air pollutants		
C 1	transport activities				-
Good governance	Policy coherence	62.	Citizen's adherence and support to EU actions		┢
		63.	Sustainability of EU actions and measures		+
	Public participation	64. 65.	Legislative compliance Communication and mobilization		\vdash
Clobal north and 1	Public participation				+
Global partnership	Globalisation of trade Financing for SD	66. 67.	Market access for least developed countries (LDC) Foreign direct investments to developing countries		+
	r mancing for SD	67.	Official Development Assistance (ODA)		\vdash
		68. 69.	Other official financing		+
	Resource management	70.	<u>v</u>		+
	resource management		resource consumption		+
		71	Air emissions & Energy	1	
		71.	Air emissions & Energy Water		+

EC	Indicator	TRANSUST	EXTENSIONS
I.	GDP per capita		
II.	Labor productivity		
III.	Employment rate		
IV.	Employment rate of older workers		
V.	Spending on human resources (public exp. on education)		
VI.	Research and Development expenditure		
VII.	Information Technology expenditure		
VIII.	Financial market integration (conv. of bank lending rates)		
IX.	At risk-of-poverty rate		
Χ.	Long-term unemployment		
XI.	Dispersion of regional employment rates		
XII.	Greenhouse gases emissions		X
XIII.	Energy intensity of the economy		
XIV.	Volume of transport		
XV.	Competitiveness		

Name of the model: GAIN

Name of institution: WIFO

A list of standard variable and indicator extensions follows on the next pages.

- 1. Are there extensions of your model by variables or indicators beyond the ones in the list? Please write them down.
- 2. Describe all variable extensions in words. What is the value added by them?
- 3. Describe all indicator extensions in words. What is the value added by them?
- 4. To what extend do the extensions prepare your model for Integrated Assessment?

Theme	Sub-theme		Areas to be addressed	TRANSUST	
Economic development	Investment	1.	Investment in R&D		
		2.	Investment in Env. Friendly technologies		X
		3.	Consumption and inflation	Х	
	Competitiveness	4.	Saving and borrowing		
	Competitiveness	<u>5.</u> 6.	Labour productivity Unit labour costs		
		7.	Life-long Learning		_
	Employment	8.	Employment rate		
	Linployment	9.	Unemployment rate		
Poverty and social	Monetary poverty	10.			
exclusion		11.	Non-monetary deprivation		
	Access to Labour Market	12.	Poverty-in-work		
	Other aspect of social exclusion	13.	Access to education		
		14.	Access to health care		
		15.	5		_
		16.	Social participation		
Aging Society	Pensions adequacy	17.	Income of elder generations		_
	Demographic changes	18.			-
		<u>19.</u> 20.	Fertility Migrations		+
	Financial Sustainability	20.	Age of withdrawal from Labour Market		+
	i manetai SustaniaUnity	21.	Pension expenditures		+
Public health	Human haalth protection and Life	23.	Financial sustainability		-
	Human health protection and Life styles	23.			+
	Styles	25.			
		26	*		
		27.	Health and safety at work		
		28.	Infectious diseases and resistance to antibiotics		
	Food Safety and Quality	29.	Pesticide residues		
		30.	Microbiological contamination		
		31.	Drinking water quality		
	Chemicals management	32.	Chemicals production and consumption		
		33.	Exposure to chemicals		
	Health risks due to environmental	34.	Air quality		
	conditions	35.	Noise exposure		
Climate change and	Climate change	36.	GHG emission reduction		X
energy	Energy	37.	67		
		38.	Energy efficiency		X
		39.	Renewable energy resources		X
		40.	Management of nuclear waste Air pollution from energy use		_
Production and	Eas officiancy	41.	Decoupling economic growth and resource use		X
	Eco-efficiency	42.	Decoupling economic growth and resource use		X
consumption patterns		44.	Decoupling economic growth and generation of wastes		
	Agriculture	45.	Pesticides use		
	Ignouture	46.	Nitrogen balances		
		47.	Environmentally-friendly farming		
	Corporate responsibility	48.	Triple bottom line		
	Consumer awareness	49.	Consumer information		
Management of natural		50.	Protection of habitats and natural systems and biodiversity		
resources		51.	Maintaining the carrying capacity		
	Marine ecosystems	52.	Over-fishing		
	Fresh water resources	53.	Water extraction and use		
		54.	Protection of surface and ground water resources		
	Land use	55.	Land use change		_
		56.	Soil degradation		
		57.	Forests		
Fransport	Transport growth	58.	Decoupling of economic and transport growth		X
		59.	Road to rail, water and public transport		
	Environmental impact of	60. 61.	Land use by transport systems Air pollutants		+
Good governon	1				+
Good governance	Policy coherence	<u>62.</u> 63.	Citizen's adherence and support to EU actions Sustainability of EU actions and measures		+
		64.	Legislative compliance		+
	Public participation	65.	Communication and mobilization		+
Global partnership	Globalisation of trade	66.	Market access for least developed countries (LDC)		+-
siooai parmersnip	Financing for SD	67.	Foreign direct investments to developing countries		+
		68.	Official Development Assistance (ODA)		+
		69.	Other official financing		1
	Resource management	70.	Resource consumption		+
		71.	Air emissions & Energy		+
		72.	Water		+
		·			-

Table 1: Variables in model	version of the Trans	Sust project and exte	nsions in TranSust.Scan
		1 5	

EC	Indicator	TRANSUST	EXTENSIONS
I.	GDP per capita	X	
II.	Labor productivity		
III.	Employment rate		
IV.	Employment rate of older workers		
V.	Spending on human resources (public exp. on education)		
VI.	Research and Development expenditure		
VII.	Information Technology expenditure		
VIII.	Financial market integration (conv. of bank lending rates)		
IX.	At risk-of-poverty rate		
Х.	Long-term unemployment		
XI.	Dispersion of regional employment rates		
XII.	Greenhouse gases emissions		X
XIII.	Energy intensity of the economy		X
XIV.	Volume of transport		X
XV.	Competitiveness		

Name of the model: ICES

Name of institution: FEEM

A list of standard variable and indicator extensions follows on the next pages.

1. Are there extensions of your model by variables or indicators beyond the ones in the list? Please write them down.

As standard with CGE models, ICES can allow the investigation of climate change impacts on international trade patterns and of the feedback of changes in trade (and more generally in the economic system) on the environment materialising as changes in major GHG emissions.

- 2. Describe all variable extensions in words. What is the value added by them?
- 3. Describe all indicator extensions in words. What is the value added by them?

The ICES model is a standard recursive dynamic computable general equilibrium model of the global economic system. Its time horizon is 2000 – 2050. As a natural feature of CGE models it can analyse international and intersectoral economic impacts of different taxation and trade policies. In particular economic implications of climate change mitigation policies can be assessed as major GHG gases are represented. Emission trading for CO2 is already embedded; N2O and CH4 emissions are modelled, but an emission trading scheme for these gases needs to be built (which is one of the direction of the present research). The inclusion of sulphur emissions is another next step. The issue of sustainability can be addressed as well, this either considering directly the impacts of climate change and of climate change policies on consumption and production levels, or extracting from the model a set of sustainability indicators of environmental, economic, and social nature (e.g. employment, income, use of natural resources, emissions etc.) whose changes respect to a reference case can be measured. Distributional issues can be considered: the model already allows for high and low income workers, this can be further expanded including different income classes (though this is not one of our near term research interest). Finally, at an aggregate (national) level, costs and benefits of "generic" health policies can be simulated. This requires some modification of the model

though, for instance changing the composition of government expenditure in favour of health care services and at the same time simulating the expected impact on labour productivity.

4. To what extend do the extensions prepare your model for Integrated Assessment?

ICES is a recursive dynamic CGE model for the world economy which has been used for the purpose of climate change impact assessment. The two major extensions on which the group is currently working are the inclusion of biodiversity and water resources as new areas of climate change impacts. This will allow (a) a more complete description of climate change impacts on the economic system (b) to consider interactions among impacts (e.g. water and agriculture productivity) (c) a more sophisticated integrated assessment exercise as water and biodiversity modules need to be coupled with the CGE model.

Theme	Sub-theme		Areas to be addressed	TRANSUST	
Economic development	Investment	1.	Investment in R&D		
		2.	Investment in Env. Friendly technologies		
		3.	Consumption and inflation		X
	Commetition and	4.	Saving and borrowing		Х
	Competitiveness	<u>5.</u> 6.	Labour productivity Unit labour costs		- X
		7.	Life-long Learning		
	Employment	8.	Employment rate		Х
	r	9.	Unemployment rate		-
Dovorty and appial	Monotory poverty	10.			Х
Poverty and social exclusion	Monetary poverty	11.	Income inequality Non-monetary deprivation		<u>л</u>
exclusion	Access to Labour Market	12.	Poverty-in-work		-
	Other aspect of social exclusion	13.	Access to education		-
		14.	Access to health care		-
		15.			-
		16.			-
Aging Society	Pensions adequacy	17.	Income of elder generations		-
	Demographic changes	18.	Life expectancy		-
		19.	Fertility		-
	Einensiel Croteinskille	20.	Migrations		-
	Financial Sustainability	21.	Age of withdrawal from Labour Market		-
Dublia health	Human haalth protoction of JT 'C		Pension expenditures		-
Public health	Human health protection and Life styles	23.	,		-
	styles	24.			-
		25.			-
		27.	Health and safety at work		-
		28.	Infectious diseases and resistance to antibiotics		-
	Food Safety and Quality	29.	Pesticide residues		-
		30.	Microbiological contamination		-
		31.	Drinking water quality		-
	Chemicals management	32.	Chemicals production and consumption		-
	c	33.	Exposure to chemicals		-
	Health risks due to environmental	34.	Air quality		Х
	conditions	35.	Noise exposure		-
Climate change and	Climate change	36.	GHG emission reduction		Х
energy	Energy	37.			Х
		38.	Energy efficiency		Х
		39.	Renewable energy resources		
		40.	Management of nuclear waste		
		41.	Air pollution from energy use		Х
Production and	Eco-efficiency	42.	Decoupling economic growth and resource use		Х
consumption patterns		43.	Decoupling economic growth and emissions		Х
	<u> </u>	44.	Decoupling economic growth and generation of wastes		-
	Agriculture	45.	Pesticides use		Х
		46.	Nitrogen balances		
	Compared and all lite	47.	Environmentally-friendly farming Triple bottom line		-
	Corporate responsibility Consumer awareness	48. 49.	Consumer information		-
Managamant of natural			Protection of habitats and natural systems and biodiversity		
Management of natural resources	Biodiversity	<u>50.</u> 51.	Maintaining the carrying capacity		- X
105041005	Marine ecosystems	52.	Over-fishing		-
	Fresh water resources	53.	Water extraction and use		X
		54.	Protection of surface and ground water resources		X
	Land use	55.		1	X
		56.	Soil degradation	1	-
		57.	Forests		Х
Transport	Transport growth	58.	Decoupling of economic and transport growth		-
	— •	59.	Road to rail, water and public transport		-
		60.	Land use by transport systems		-
	Environmental impact of transport activities	61.	Air pollutants		-
Good governance	Policy coherence	62.	Citizen's adherence and support to EU actions		-
		63.	Sustainability of EU actions and measures		-
		64.	Legislative compliance		-
	Public participation	65.	Communication and mobilization		-
Global partnership	Globalisation of trade	66.	Market access for least developed countries (LDC)		-
-	Financing for SD	67.	Foreign direct investments to developing countries		-
		68.	Official Development Assistance (ODA)		-
					-
		69.	Other official financing		
	Resource management	70.	Resource consumption		Х
	Resource management				

EC	Indicator	TRANSUST	EXTENSIONS
I.	GDP per capita		X
II.	Labor productivity		Х
III.	Employment rate		Х
IV.	Employment rate of older workers		-
V.	Spending on human resources (public exp. on education)		-
VI.	Research and Development expenditure		
VII.	Information Technology expenditure		-
VIII.	Financial market integration (conv. of bank lending rates)		-
IX.	At risk-of-poverty rate		-
Х.	Long-term unemployment		-
XI.	Dispersion of regional employment rates		-
XII.	Greenhouse gases emissions		X
XIII.	Energy intensity of the economy		X
XIV.	Volume of transport		-
XV.	Competitiveness		-

Name of the model: IMACLIM¹

Name of institution: SMASH-CIRED

A list of standard variable and indicator extensions follows on the next pages.

- Are there extensions of your model by variables or indicators beyond the ones in the list? Please write them down.
- 2. Describe all variable extensions in words. What is the value added by them?
- 3. Describe all indicator extensions in words. What is the value added by them?
- 4. To what extend do the extensions prepare your model for Integrated Assessment?

SMASH-CIRED's contribution to the first year of TranSust.Scan focused on modelling local pollutant emissions from road transportation in Europe. Emissions are computed 'ex post', on the basis of modelling results and assumptions from three distinct sources: the IMACLIM-R and POLES models produce harmonised scenarios of the global economy and energy markets up to 2050; the SMP model provides emission coefficients for 5 local pollutions from transportation activities (particulate matter, nitrogen oxides, carbon monoxide, non burnt hydrocarbons and lead). Road transportation activities are disaggregated in 18 vehicle types, amongst which 9 LDV types discriminated by technology or fuel. The disaggregation remains valid at the margin of the available scenarios (2 so far), and a set of policy levers (market share of technologies, aggregate mobility, emission standards, gap between western and transition economies, etc.) are represented to allow for policy exploration.

The second set of extensions, related to 'Poverty and social exclusion' and 'Aging society' categories, is work-in-progress only. The representative consumer of an open economy of IMACLIM restricted to France is being disaggregated in 3 revenue classes \times 2 age classes (active and retired), with the corresponding income tracked on the resource side of the economy (labour vs

¹ IMACLIM runs in both a static and a dynamic recursive version, IMACLIM-S and IMACLIM-R. With the two versions closely connected, a unique table is filled in aggregating the variables (modelling abilities) of both versions.

transfer revenues). The purpose is to explore the tensions that develop on financing transfer revenues (pensions) as the age structure of the economy evolves—demography remains exogenous, drawn from UN 2004 scenarios. Alternative scenarios will assess different means of addressing the underlying challenge: age of withdrawal from labour market, decrease of the pensions in real terms and their welfare consequences, increase of fiscal pressure to maintain retirement conditions inc. recycling of the revenues from a carbon tax.

Theme	Sub-theme		Areas to be addressed	IRANSUST	
Economic development	Investment	1.	Investment in R&D		
		2.	Investment in Env. Friendly technologies	Х	
		3.	Consumption and inflation	X	
		4.	Saving and borrowing	X	
	Competitiveness	5.	Labour productivity	X	
		6.	Unit labour costs	X	
	England	7.	Life-long Learning	v	_
	Employment	8.	Employment rate	Х	_
		9.	Unemployment rate	Х	
overty and social	Monetary poverty	10.	Income inequality		Х
exclusion		11.	Non-monetary deprivation		
	Access to Labour Market	12.	Poverty-in-work		
	Other aspect of social exclusion	13.	Access to education		
		14.	Access to health care		
		15.			
		16.	Social participation		
Aging Society	Pensions adequacy	17.	Income of elder generations		Х
	Demographic changes	18.	Life expectancy		
		19.	Fertility		Γ
		20.	Migrations		Γ
	Financial Sustainability	21.	Age of withdrawal from Labour Market		Х
		22.	Pension expenditures		X
Public health	Human health protection and Life	23.	Financial sustainability		T
	styles	24.	Disability-free life expectancy		1
		25.		1	
		26	Life styles		
		27.	Health and safety at work		
		28.	Infectious diseases and resistance to antibiotics		
	Food Safety and Quality	29.	Pesticide residues		
		30.	Microbiological contamination		
		31.	Drinking water quality		
	Chemicals management	32.	Chemicals production and consumption		
	e	33.	Exposure to chemicals		
	Health risks due to environmental	34.	Air quality		Х
	conditions	35.	Noise exposure		
Climate change and	Climate change	36.	GHG emission reduction	Х	
energy	Energy	37.		X	
65	. 89	38.	Energy efficiency	Х	
		39.	Renewable energy resources	Х	
		40.	Management of nuclear waste		
		41.	Air pollution from energy use		X
Production and	Eco-efficiency	42.	Decoupling economic growth and resource use	Х	
consumption patterns	Lee enterency	43.	Decoupling economic growth and emissions	X	
r r		44.	Decoupling economic growth and generation of wastes		
	Agriculture	45.	Pesticides use		
	- ignound	46.	Nitrogen balances		
		47.	Environmentally-friendly farming		
	Corporate responsibility	48.	Triple bottom line		
	Consumer awareness	49.	Consumer information		
Management of natural		50.	Protection of habitats and natural systems and biodiversity	I	
resources	Liouversity	51.	Maintaining the carrying capacity		+
					+
	Marine ecosystems	52	Over-fishing		
	Marine ecosystems Fresh water resources	<u>52.</u> 53	Over-fishing Water extraction and use		
	Marine ecosystems Fresh water resources	53.	Water extraction and use		
	Fresh water resources	<u>53.</u> 54.	Water extraction and use Protection of surface and ground water resources		
		53. 54. 55.	Water extraction and use Protection of surface and ground water resources Land use change		
	Fresh water resources	53. 54. 55. 56.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation		
	Fresh water resources Land use	53. 54. 55. 56. 57.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests		
	Fresh water resources	53. 54. 55. 56. 57. 58.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth		
	Fresh water resources Land use	53. 54. 55. 56. 57. 58. 59.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport	X X	
	Fresh water resources Land use Transport growth	53. 54. 55. 56. 57. 58. 59. 60.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems		
	Fresh water resources Land use Transport growth Environmental impact of	53. 54. 55. 56. 57. 58. 59. 60.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport		X
Fransport	Fresh water resources Land use Transport growth Environmental impact of transport activities	53. 54. 55. 56. 57. 58. 59. 60. 61.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants		
Fransport	Fresh water resources Land use Transport growth Environmental impact of	53. 54. 55. 56. 57. 58. 59. 60. 61. 62.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions		
Fransport	Fresh water resources Land use Transport growth Environmental impact of transport activities	53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures		
Fransport	Fresh water resources Land use Transport growth Environmental impact of transport activities Policy coherence	53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures Legislative compliance		
Fransport Good governance	Fresh water resources Land use Transport growth Environmental impact of transport activities Policy coherence Public participation	53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures Legislative compliance Communication and mobilization	X	
Fransport Good governance	Fresh water resources Land use Transport growth Environmental impact of transport activities Policy coherence Public participation Globalisation of trade	53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures Legislative compliance Communication and mobilization Market access for least developed countries (LDC)	X	
Fransport Good governance	Fresh water resources Land use Transport growth Environmental impact of transport activities Policy coherence Public participation	53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures Legislative compliance Communication and mobilization Market access for least developed countries (LDC) Foreign direct investments to developing countries	X	
Transport Good governance	Fresh water resources Land use Transport growth Environmental impact of transport activities Policy coherence Public participation Globalisation of trade	53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures Legislative compliance Communication and mobilization Market access for least developed countries (LDC) Foreign direct investments to developing countries Official Development Assistance (ODA)	X	
Transport Good governance	Fresh water resources Land use Transport growth Environmental impact of transport activities Policy coherence Public participation Globalisation of trade Financing for SD	53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures Legislative compliance Communication and mobilization Market access for least developed countries (LDC) Foreign direct investments to developing countries Official Development Assistance (ODA) Other official financing	X X X X	
Transport Good governance Global partnership	Fresh water resources Land use Transport growth Environmental impact of transport activities Policy coherence Public participation Globalisation of trade	53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures Legislative compliance Communication and mobilization Market access for least developed countries (LDC) Foreign direct investments to developing countries Official Development Assistance (ODA) Other official financing Resource consumption	X X X X X	
Transport Good governance	Fresh water resources Land use Transport growth Environmental impact of transport activities Policy coherence Public participation Globalisation of trade Financing for SD	53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69.	Water extraction and use Protection of surface and ground water resources Land use change Soil degradation Forests Decoupling of economic and transport growth Road to rail, water and public transport Land use by transport systems Air pollutants Citizen's adherence and support to EU actions Sustainability of EU actions and measures Legislative compliance Communication and mobilization Market access for least developed countries (LDC) Foreign direct investments to developing countries Official Development Assistance (ODA) Other official financing	X X X X	

EC	Indicator	TRANSUST	EXTENSIONS
I.	GDP per capita	X	
II.	Labor productivity	Х	
III.	Employment rate	Χ	
IV.	Employment rate of older workers		
V.	Spending on human resources (public exp. on education)		
VI.	Research and Development expenditure		
VII.	Information Technology expenditure		
VIII.	Financial market integration (conv. of bank lending rates)		
IX.	At risk-of-poverty rate		
Х.	Long-term unemployment	Χ	
XI.	Dispersion of regional employment rates		
XII.	Greenhouse gases emissions	Χ	
XIII.	Energy intensity of the economy	Χ	
XIV.	Volume of transport	X	
XV.	Competitiveness	X	

Name of the model: IMPEC (input-output), W8D (econometric)

Name of institution: LIFEA (Łódź, Poland)

A list of standard variable and indicator extensions follows on the next pages.

- Are there extensions of your model by variables or indicators beyond the ones in the list? Please write them down.
- YES, at least three very important from the point of view of sustainability variables:
 - a. human capital,
 - b. total factor productivity,
 - c. Human Development Index
- 2. Describe all variable extensions in words. What is the value added by them?

(see the paper Modeling Various Aspects of Sustainability. The Case of Poland)

- a) human capital: crucial measure for economic growth; one of the most important measures of social sustainability; positive correlation between human capital and social perception and attitude towards sustainability,
- b) total factor productivity: in short variable associated with and approximating technological progress, thus crucial for decreasing environmental pressure
- 3. Describe all indicator extensions in words. What is the value added by them?
- c) Human Development Index: one of the most frequently quoted aggregate measure of sustainable development; slightly modified for the purpose of current investigation (stress put on secondary and tertiary education rather than on literacy ratio)
- 4. To what extend do the extensions prepare your model for Integrated Assessment?

They seem to vastly enrich investigations into various aspects of sustainability as they all are frequently used in such research. Besides, the measure of human capital proposed in the analysis

comprises – at least implicitly – all the main aspects of what is associated with human capital in its broad definition, namely: education, learning by doing and health status.

NOTE on the list

Some of the variables indicated in the table will be only exogenous in the models. The whole W8D model will be updated to take advantage of the latest information, so that finally a new model will emerge, which justifies ticking *core* and *extended* columns at the same time.

Theme	Sub-theme		Areas to be addressed	TRANSUS 1	
Economic development	Investment	1.	Investment in R&D	Х	Х
Leononne development		2.	Investment in Env. Friendly technologies		
		3.	Consumption and inflation	X	X
	Competitiveness	4.	Saving and borrowing Labour productivity	X	X
	Competitiveness	6.	Unit labour costs	X	X
		7.	Life-long Learning		X
	Employment	8.	Employment rate	Х	Х
		9.	Unemployment rate	Х	Х
Poverty and social	Monetary poverty	10.	Income inequality		
exclusion	stored proves	11.	Non-monetary deprivation		
	Access to Labour Market	12.	Poverty-in-work		
	Other aspect of social exclusion	13.			Х
		14.			
		15.			_
	D	16.			v
Aging Society	Pensions adequacy Demographic changes	17.	Income of elder generations Life expectancy		X
	Demographic changes	19.	Fertility		X
		20.	Migrations		X
	Financial Sustainability	21.	Age of withdrawal from Labour Market		X
		22.	Pension expenditures		Х
Public health	Human health protection and Life	23.	Financial sustainability		Τ
	styles	24.			
		25.			Х
		26			
		27.	Health and safety at work		
	Fred Cafeta and Quality	28.	Infectious diseases and resistance to antibiotics		-
	Food Safety and Quality	<u>29.</u> 30.	Pesticide residues Microbiological contamination		-
		31.	Drinking water quality		Х
	Chemicals management	32.	Chemicals production and consumption		
	Chemieurs munugement	33.	Exposure to chemicals		+
	Health risks due to environmental	34.	Air quality		Х
	conditions	35.	Noise exposure		
Climate change and	Climate change	36.	GHG emission reduction		Х
energy	Energy	37.			Х
		38.	Energy efficiency		
		39.	Renewable energy resources		
		40.	Management of nuclear waste		
		41.	Air pollution from energy use		_
Production and	Eco-efficiency	42.	Decoupling economic growth and resource use		v
consumption patterns		43.	Decoupling economic growth and emissions Decoupling economic growth and generation of wastes		Х
	Agriculture	44.	Pesticides use		+
	Agriculture	46.	Nitrogen balances		
		47.	Environmentally-friendly farming		
	Corporate responsibility	48.	Triple bottom line		
	Consumer awareness	49.	Consumer information		
Management of natural	Biodiversity	50.	Protection of habitats and natural systems and biodiversity		
resources		51.	Maintaining the carrying capacity		Γ
	Marine ecosystems	52.	Over-fishing		
	Fresh water resources	53.	Water extraction and use		_
	T 1	54.	Protection of surface and ground water resources		_
	Land use	55. 56.	Land use change Soil degradation	<u> </u>	+
		57.	Forests		-
Fransport	Transport growth	58.	Decoupling of economic and transport growth		-
ransport	Transport growin	<u> </u>	Road to rail, water and public transport		+
		60.	Land use by transport systems		+
	Environmental impact of		Air pollutants		1
	transport activities		-		
Good governance	Policy coherence	62.	Citizen's adherence and support to EU actions		\perp
		63.	Sustainability of EU actions and measures		1
	Dublic nonticipation	64.	Legislative compliance		+
31.1.1	Public participation	65.	Communication and mobilization		+
Global partnership	Globalisation of trade	66.	Market access for least developed countries (LDC)		+
	Financing for SD	67.	Foreign direct investments to developing countries		+
		68.	Official Development Assistance (ODA) Other official financing		+
	Resource management	<u>69.</u> 70.	č		+
	resource management				+
		71	Air emissions & Energy		
		71.	Air emissions & Energy Water		+

EC	Indicator	TRANSUST	EXTENSIONS
I.	GDP per capita	X	X
II.	Labor productivity	X	Χ
III.	Employment rate	X	Χ
IV.	Employment rate of older workers		Х
V.	Spending on human resources (public exp. on education)		
VI.	Research and Development expenditure	X	X
VII.	Information Technology expenditure		
VIII.	Financial market integration (conv. of bank lending rates)		
IX.	At risk-of-poverty rate		
Х.	Long-term unemployment		
XI.	Dispersion of regional employment rates		
XII.	Greenhouse gases emissions		Χ
XIII.	Energy intensity of the economy		
XIV.	Volume of transport		
XV.	Competitiveness		

Name of the model: KLUM

Name of institution: University of Hamburg

A list of standard variable and indicator extensions follows on the next pages.

Note that the model was not part of the original TranSust model set. Therefore no comparison is possible. The EC structural indicators do not apply to the stand-alone version of the model. These could be addressed only when coupled to a CGE or DGVM.

 Are there extensions of your model by variables or indicators beyond the ones in the list? Please write them down.

The original version of KLUM determined optimal land use allocations based on potential agricultural yields, land availability, and commodity prices. The extension to KLUM-W also includes water resources by recognizing that irrigation has profound impacts on agricultural production and therefore land allocation particularly in scenarios of increased water scarcity.

2. Describe all variable extensions in words. What is the value added by them?

The inclusion of water resources in a land use allocation model leads to improvements in the optimal land allocation algorithm since the important role of the substantial area of irrigated agriculture is no longer neglected. Furthermore, increased competition for water and a larger water scarcity can then be considered in model simulations.

- 3. Describe all indicator extensions in words. What is the value added by them?
- 4. To what extent do the extensions prepare your model for Integrated Assessment?

KLUM and KLUM-W are supposed to be used as a coupling tool to attach to another CGE or DGVM as needed in an integrated assessment framework. Such analyses have already been conducted with KLUM and will therefore also be possible with the extended KLUM-W version.

Theme	Sub-theme		Areas to be addressed	TRANSUST	
Economic development	Investment	1.	Investment in R&D		L
Economic development		2.	Investment in Env. Friendly technologies		
		3.	Consumption and inflation		
	Commetition	4.	Saving and borrowing		_
	Competitiveness	<u>5.</u> 6.	Labour productivity Unit labour costs		
		7.	Life-long Learning		
	Employment	8.	Employment rate		
	r	9.	Unemployment rate		
Poverty and social	Monotomy novients	10.	Income inequality		-
exclusion	Monetary poverty	11.	Non-monetary deprivation		-
eneration	Access to Labour Market	12.	Poverty-in-work		
		13.			
	Other aspect of social exclusion	14.	Access to health care		
		15.			
		16.	Social participation		
Aging Society	Pensions adequacy	17.	Income of elder generations		
	Demographic changes	18.	Life expectancy		
		19.	Fertility		1
		20.	Migrations		1
	Financial Sustainability	21.	Age of withdrawal from Labour Market		-
Dahla La 14	Hammen handel of the second	22.	Pension expenditures		-
Public health	Human health protection and Life	23.			-
	styles	24.			+
		25. 26			+
		27.	Health and safety at work		
		28.	Infectious diseases and resistance to antibiotics		
	Food Safety and Quality	29.	Pesticide residues		
		30.	Microbiological contamination		
		31.	Drinking water quality		
	Chemicals management	32.	Chemicals production and consumption		
	-	33.	Exposure to chemicals		
	Health risks due to environmental	34.	Air quality		
	conditions	35.	Noise exposure		
Climate change and	Climate change	36.	GHG emission reduction		
energy	Energy	37.			
		38.	Energy efficiency		
		39.	Renewable energy resources		
		40.	Management of nuclear waste		
		41.	Air pollution from energy use		
Production and	Eco-efficiency	42.	Decoupling economic growth and resource use		
consumption patterns		43.	Decoupling economic growth and emissions		_
	A 1.	44.	Decoupling economic growth and generation of wastes		_
	Agriculture	45.	Pesticides use		_
		46.	Nitrogen balances Environmentally-friendly farming		-
	Corporate responsibility	47.	Triple bottom line		-
	Consumer awareness	49.	Consumer information		
Management of natural		50.	Protection of habitats and natural systems and biodiversity		
resources	2.5diversity	51.	Maintaining the carrying capacity		+
	Marine ecosystems	52.	Over-fishing		\vdash
	Fresh water resources	53.	Water extraction and use		Х
	_	54.	Protection of surface and ground water resources		Х
	Land use	55.			Х
		56.	Soil degradation		Х
		57.	Forests		Х
Transport	Transport growth	58.	Decoupling of economic and transport growth		
		59.	Road to rail, water and public transport		
		60.	Land use by transport systems		1
	Environmental impact of	61.	Air pollutants		
C 1	transport activities				-
Good governance	Policy coherence	62.	Citizen's adherence and support to EU actions		┢
		63.	Sustainability of EU actions and measures		+
	Public participation	64. 65.	Legislative compliance Communication and mobilization		\vdash
Clobal north and 1	Public participation				+
Global partnership	Globalisation of trade Financing for SD	66. 67.	Market access for least developed countries (LDC) Foreign direct investments to developing countries		+
	r mancing for SD	67.	Official Development Assistance (ODA)		\vdash
		68. 69.	Other official financing		+
	Resource management	70.			+
	resource management		resource consumption		+
		71	Air emissions & Energy	1	
		71.	Air emissions & Energy Water		+

EC	Indicator	TRANSUST	EXTENSIONS
I.	GDP per capita		
II.	Labor productivity		
III.	Employment rate		
IV.	Employment rate of older workers		
V.	Spending on human resources (public exp. on education)		
VI.	Research and Development expenditure		
VII.	Information Technology expenditure		
VIII.	Financial market integration (conv. of bank lending rates)		
IX.	At risk-of-poverty rate		
Х.	Long-term unemployment		
XI.	Dispersion of regional employment rates		
XII.	Greenhouse gases emissions		
XIII.	Energy intensity of the economy		
XIV.	Volume of transport		
XV.	Competitiveness		

Name of the model: MARKAL

Name of institution: ECN

A list of standard variable and indicator extensions follows on the next pages.

 Are there extensions of your model by variables or indicators beyond the ones in the list? Please write them down.

The Carbon Capture and Storage (CCS) technology is added, as well as geological CO2 leakage.

2. Describe all variable extensions in words. What is the value added by them?

item 34 : NOx, SOx emission of the energy system -> acidification item 59 : modal shift could be included as exogenous determined or using a fixed substitution elasticity

item 63 : the impact of EU energy policies and measures (RES-E, biofuels, ...) can be provided

3. Describe all indicator extensions in words. What is the value added by them?

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4. To what extend do the extensions prepare your model for Integrated Assessment?

Theme	Sub-theme		Areas to be addressed	TRANSUST	
Economic development	Investment	1.	Investment in R&D		
Leononne development		2.	Investment in Env. Friendly technologies	Х	
		3.	Consumption and inflation		_
	Commetition and	4.	Saving and borrowing		_
	Competitiveness	<u>5.</u> 6.	Labour productivity Unit labour costs		_
		7.	Life-long Learning		
	Employment	8.	Employment rate		
	r	9.	Unemployment rate		
Descentry and actual	Monotory poverty		Income inequality		-
Poverty and social exclusion	Monetary poverty	10.	Non-monetary deprivation		-
enerasion	Access to Labour Market	12.	Poverty-in-work		
		13.			
	Other aspect of social exclusion	14.			
		15.			
		16.	Social participation		
Aging Society	Pensions adequacy	17.	Income of elder generations		
	Demographic changes	18.	Life expectancy		
		19.	Fertility		_
		20.	Migrations		1
	Financial Sustainability	21.	5		-
Deck 1: - 1: 1:1	Hamen haalda aa di aa ta'a	22.	Pension expenditures		-
Public health	Human health protection and Life	23.	~		-
	styles	24.	, <u>,</u> , ,		-
		25. 26			-
		20			
		27.	Infectious diseases and resistance to antibiotics		-
	Food Safety and Quality	29.	Pesticide residues		
		30.	Microbiological contamination		
		31.	Drinking water quality		
	Chemicals management	32.	Chemicals production and consumption		
	c	33.	Exposure to chemicals		
	Health risks due to environmental	34.	Air quality		Х
	conditions	35.	Noise exposure		
Climate change and	Climate change	36.	GHG emission reduction	Х	
energy	Energy	37.	Energy taxes	Х	
		38.	Energy efficiency	Х	
		39.	Renewable energy resources	Х	
		40.	Management of nuclear waste	Х	
		41.	Air pollution from energy use	Х	
Production and	Eco-efficiency	42.	Decoupling economic growth and resource use	Х	
consumption patterns		43.	Decoupling economic growth and emissions	Х	
1 1		44.	Decoupling economic growth and generation of wastes		
	Agriculture	45.			
		46.			_
	Compared and all lite	47.	Environmentally-friendly farming Triple bottom line		-
	Corporate responsibility Consumer awareness	48. 49.	Consumer information		
Management of natural					-
Management of natural resources	Biodiversity	50. 51.	Protection of habitats and natural systems and biodiversity Maintaining the carrying capacity		
105001005	Marine ecosystems	52.	Over-fishing		
	Fresh water resources	53.	<u> </u>		+
		54.			+
	Land use	55.		Х	1
		56.	Soil degradation		T
		57.		Х	L
Transport	Transport growth	58.	Decoupling of economic and transport growth		
-		59.	Road to rail, water and public transport		Х
		60.	Land use by transport systems		
	Environmental impact of transport activities	61.	Air pollutants	Х	
	Policy coherence	62.	Citizen's adherence and support to EU actions		
Good governance	Foncy concretence	63.	Sustainability of EU actions and measures		Х
Good governance	roncy concrence				1 7
Good governance		64.	Legislative compliance		-
	Public participation		Legislative compliance Communication and mobilization		
	Public participation Globalisation of trade	64. 65. 66.	Legislative compliance Communication and mobilization Market access for least developed countries (LDC)		
	Public participation	64. 65. 66. 67.	Legislative compliance Communication and mobilization Market access for least developed countries (LDC) Foreign direct investments to developing countries		
	Public participation Globalisation of trade	64. 65. 66. 67. 68.	Legislative compliance Communication and mobilization Market access for least developed countries (LDC) Foreign direct investments to developing countries Official Development Assistance (ODA)		
	Public participation Globalisation of trade Financing for SD	64. 65. 66. 67. 68. 69.	Legislative compliance Communication and mobilization Market access for least developed countries (LDC) Foreign direct investments to developing countries Official Development Assistance (ODA) Other official financing		
	Public participation Globalisation of trade	64. 65. 66. 67. 68. 69. 70.	Legislative compliance Communication and mobilization Market access for least developed countries (LDC) Foreign direct investments to developing countries Official Development Assistance (ODA) Other official financing Resource consumption	X	
Good governance Global partnership	Public participation Globalisation of trade Financing for SD	64. 65. 66. 67. 68. 69.	Legislative compliance Communication and mobilization Market access for least developed countries (LDC) Foreign direct investments to developing countries Official Development Assistance (ODA) Other official financing	X X X	

EC	Indicator	TRANSUST	EXTENSIONS
I.	GDP per capita		
II.	Labor productivity		
III.	Employment rate		
IV.	Employment rate of older workers		
V.	Spending on human resources (public exp. on education)		
VI.	Research and Development expenditure		
VII.	Information Technology expenditure		
VIII.	Financial market integration (conv. of bank lending rates)		
IX.	At risk-of-poverty rate		
Χ.	Long-term unemployment		
XI.	Dispersion of regional employment rates		
XII.	Greenhouse gases emissions	X	
XIII.	Energy intensity of the economy	X	
XIV.	Volume of transport		
XV.	Competitiveness		

Name of the model: PACE

Name of institution: ZEW

A list of standard variable and indicator extensions follows on the next pages.

1. Are there extensions of your model by variables or indicators beyond the ones in the list? Please write them down.

Revealed comparative advantage indicators: RCA-Indicator, RTB-Indicator, RWS-Indicator

- 2. Describe all variable extensions in words. What is the value added by them?
- 3. Describe all indicator extensions in words. What is the value added by them?

The indicators introduced into PACE represent a number of indicators from the literature used to analyse explicitly international competitiveness issues, such as comparative advantages in trade.

4. To what extend do the extensions prepare your model for Integrated Assessment?

The new indicators allow for an analysis of the impact on competitiveness of environmental policy scenarios that are analysed in an integrated assessment framework.

Theme	Sub-theme		Areas to be addressed	IRANSUS1	
Economic development	Investment	1.	Investment in R&D	Х	Γ
Leononne development		2.	Investment in Env. Friendly technologies	Х	
		3.	Consumption and inflation	X	
	Commetition and	4.	Saving and borrowing	X	+
	Competitiveness	5.	Labour productivity Unit labour costs	X	-
		<u>6.</u> 7.	Life-long Learning	A	-
	Employment	8.	Employment rate	Х	-
		9.	Unemployment rate	X	┢
Descentry and capiel	Monotory noverty		Income inequality	X	-
Poverty and social exclusion	Monetary poverty	10.	Non-monetary deprivation	A	+
	Access to Labour Market	12.	Poverty-in-work		+
		13.			t
	Other aspect of social exclusion	14.			Γ
		15.			
		16.	Social participation		
Aging Society	Pensions adequacy	17.	Income of elder generations		
	Demographic changes	18.	Life expectancy		Ĺ
		19.	Fertility		L
	P	20.	Migrations		⊢
	Financial Sustainability	21.	5		╞
D1-12 - 114	Homen health at the little	22.	Pension expenditures		╞
Public health	Human health protection and Life	23.			┢
	styles	24. 25.			┢
		25. 26	· · · · · · · · · · · · · · · · · · ·		┢
		27.		<u> </u>	+
		28.	Infectious diseases and resistance to antibiotics		+
	Food Safety and Quality	29.	Pesticide residues		-
		30.	Microbiological contamination		t
		31.	Drinking water quality		Τ
	Chemicals management	32.	Chemicals production and consumption		
		33.	Exposure to chemicals		
	Health risks due to environmental	34.	Air quality		
	conditions	35.	Noise exposure		
Climate change and	Climate change	36.	GHG emission reduction	X	
energy	Energy	37.		X	
		38.	Energy efficiency	X	_
		39.	Renewable energy resources	Х	_
		40.	Management of nuclear waste	X	+
	Eco-efficiency	41.	Air pollution from energy use		-
Production and	Eco-efficiency	42.	Decoupling economic growth and resource use Decoupling economic growth and emissions	X	-
consumption patterns		44.	Decoupling economic growth and generation of wastes	A	-
	Agriculture	45.			+
	Ignouluie	46.			1
		47.	Environmentally-friendly farming		1
	Corporate responsibility	48.	Triple bottom line		T
	Consumer awareness	49.	Consumer information		T
Management of natural	Biodiversity	50.	Protection of habitats and natural systems and biodiversity		Г
resources	·	51.	Maintaining the carrying capacity		Γ
	Marine ecosystems	52.	Over-fishing		
	Fresh water resources	53.			
		54.	ĕ		
	Land use	55.			⊢
		56.	Soil degradation		╞
r .	TT / J	57.			┡
Fransport	Transport growth	58.	Decoupling of economic and transport growth	X	┢
		<u>59.</u>	Road to rail, water and public transport	X	┢
	Environmental impact of	60.	Land use by transport systems		┢
	transport activities	61.	Air pollutants	Х	1
Good governance	Policy coherence	62.	Citizen's adherence and support to EU actions		┢
Sood Bovernance		63.	Sustainability of EU actions and measures		+
		64.	Legislative compliance		+
	Public participation	65.	Communication and mobilization	İ	t
Global partnership	Globalisation of trade	66.	Market access for least developed countries (LDC)	<u> </u>	亡
rannoromp	Financing for SD	67.			┢
		68.	Official Development Assistance (ODA)	<u> </u>	t
		69.	Other official financing		t
	Resource management	70.	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~		T
	-	71.	Air emissions & Energy		Γ
		72.	Water		Γ
		73.	Waste		F

EC	Indicator	TRANSUST	EXTENSIONS
I.	GDP per capita	X	
II.	Labor productivity	X	
III.	Employment rate	X	
IV.	Employment rate of older workers		
V.	Spending on human resources (public exp. on education)		
VI.	Research and Development expenditure	X	
VII.	Information Technology expenditure		
VIII.	Financial market integration (conv. of bank lending rates)		
IX.	At risk-of-poverty rate		
Χ.	Long-term unemployment		
XI.	Dispersion of regional employment rates		
XII.	Greenhouse gases emissions		
XIII.	Energy intensity of the economy	X	
XIV.	Volume of transport	X	
XV.	Competitiveness		X

Name of the model: WITCH

Name of institution: FEEM

A list of standard variable and indicator extensions follows on the next pages.

1 Are there extensions of your model by variables or indicators beyond the ones in the list? Please write them down.

Investments in:

Traditional Coal Advanced Coal and CCS Gas Oil Biofuels and biomass Average Temperature Net import of permits given a specified carbon market Energy Technology Spillover

2 Describe all variable extensions in words. What is the value added by them?

Better understanding of the energy sector, technical progress, climate policy and climate damages

3 Describe all indicator extensions in words. What is the value added by them?

4 To what extend do the extensions prepare your model for Integrated Assessment?

The model has been prepared to better mimic energy technological progress which is a key factor in decoupling economic growth from GHGs emissions. In addition, it is a very important factor when dealing with distributional issues.

Theme	Sub-theme		Areas to be addressed	IRANSUST	
Economic development	Investment	1.	Investment in R&D		Х
Leonomie de teropment		2.	Investment in Env. Friendly technologies		Х
		3.	Consumption and inflation		X
	Competitiveness	<u>4.</u> 5.	Saving and borrowing Labour productivity		X
	Competitiveness	6.	Unit labour costs		X
		7.	Life-long Learning		7
	Employment	8.	Employment rate		-
		9.	Unemployment rate		-
Poverty and social	Monetary poverty	10.	Income inequality		Х
exclusion	moneury poverty	11.	Non-monetary deprivation		-
	Access to Labour Market	12.	Poverty-in-work		-
	Other aspect of social exclusion	13.			-
	Stiler aspect of social exclusion	14.	Access to health care		-
		15.			-
	D	16.			-
Aging Society	Pensions adequacy Demographic changes	17. 18.	Income of elder generations Life expectancy		-
	Demographic changes	19.	Fertility		-
		20.	Migrations		-
	Financial Sustainability	21.	Age of withdrawal from Labour Market	1	-
		22.	Pension expenditures		-
Public health	Human health protection and Life	23.			-
	styles	24.			-
		25.			-
		26			-
		27.	Health and safety at work Infectious diseases and resistance to antibiotics		-
	Food Safety and Quality	28.	Pesticide residues		-
	1 ood Salety and Quanty	30.	Microbiological contamination		-
		31.			-
	Chemicals management	32.	Chemicals production and consumption		-
		33.	Exposure to chemicals		-
	Health risks due to environmental	34.	Air quality		Х
	conditions	35.	Noise exposure		-
Climate change and	Climate change	36.	GHG emission reduction		Х
energy	Energy	37.	0.		X
		<u>38.</u> 39.	Energy efficiency Renewable energy resources		X
		40.	Management of nuclear waste		X
		41.	Air pollution from energy use		X
	Eco-efficiency	42.			Х
Production and		43.	Decoupling economic growth and emissions		Х
consumption patterns		44.	Decoupling economic growth and generation of wastes		-
	Agriculture	45.			-
		46.	Nitrogen balances		-
		47.	Environmentally-friendly farming		-
	Corporate responsibility	48.	Triple bottom line		-
M	Consumer awareness	49.	Consumer information Protection of habitats and natural systems and biodiversity		-
Management of natural resources	Biodiversity	50. 51.			-
	Marine ecosystems	51.	Maintaining the carrying capacity Over-fishing		-
	Fresh water resources	53.		1	-
		54.			-
	Land use	55.	Land use change		-
		56.	Soil degradation		-
		57.	Forests		Х
Fransport	Transport growth	58.	Decoupling of economic and transport growth		-
		59.	Road to rail, water and public transport		-
		60.	Land use by transport systems		-
	Environmental impact of transport activities	61.	Air pollutants		-
	Policy coherence	62.	Citizen's adherence and support to EU actions		-
Good governance		63.	Sustainability of EU actions and measures		-
Good governance	r oney concrence				-
Good governance		64.	Legislative compliance		÷
Good governance			Legislative compliance Communication and mobilization		-
_	Public participation	64.	Communication and mobilization		-
_		64. 65.	Communication and mobilization Market access for least developed countries (LDC)		-
-	Public participation Globalisation of trade	64. 65. 66.	Communication and mobilization Market access for least developed countries (LDC)		-
-	Public participation Globalisation of trade	64. 65. 66. 67. 68. 69.	Communication and mobilization Market access for least developed countries (LDC) Foreign direct investments to developing countries Official Development Assistance (ODA) Other official financing		-
Good governance Global partnership	Public participation Globalisation of trade	64. 65. 66. 67. 68. 69. 70.	Communication and mobilization Market access for least developed countries (LDC) Foreign direct investments to developing countries Official Development Assistance (ODA) Other official financing Resource consumption		- - - X
-	Public participation Globalisation of trade Financing for SD	64. 65. 66. 67. 68. 69.	Communication and mobilization Market access for least developed countries (LDC) Foreign direct investments to developing countries Official Development Assistance (ODA) Other official financing		

EC	Indicator	TRANSUST	EXTENSIONS
I.	GDP per capita		Х
II.	Labor productivity		Х
III.	Employment rate		-
IV.	Employment rate of older workers		-
V.	Spending on human resources (public exp. on education)		-
VI.	Research and Development expenditure		Х
VII.	Information Technology expenditure		-
VIII.	Financial market integration (conv. of bank lending rates)		-
IX.	At risk-of-poverty rate		-
Х.	Long-term unemployment		-
XI.	Dispersion of regional employment rates		-
XII.	Greenhouse gases emissions		Х
XIII.	Energy intensity of the economy		Χ
XIV.	Volume of transport		-
XV.	Competitiveness		-

Name of the model: W8D (econometric)

Name of institution: LIFEA (Łódź, Poland)

See under IMPEC