Introduction

The Green Jobs Assessment Model

Designing Better Climate Policies

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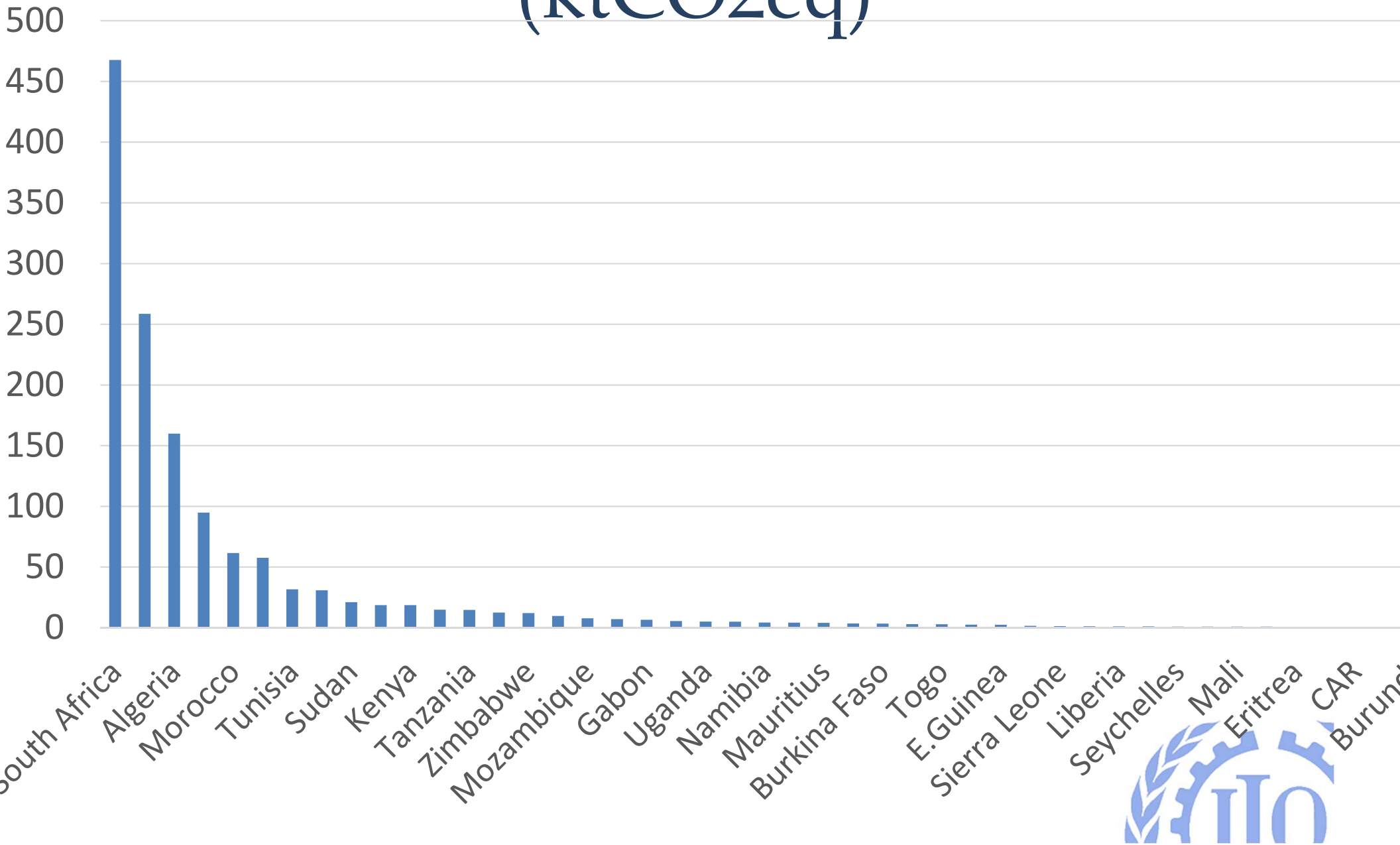
Outline

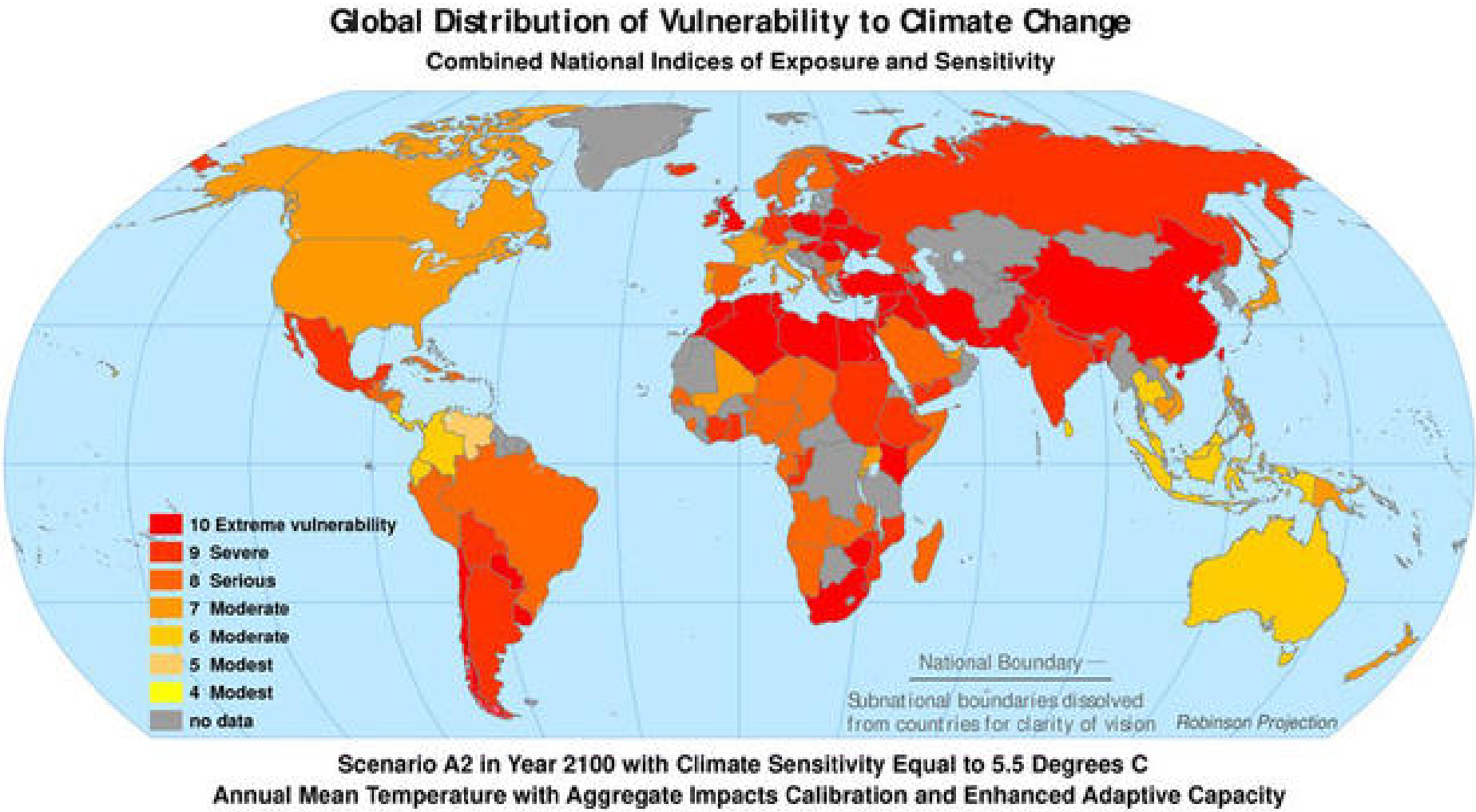
1. What is it we want to know?
2. Which model helps us to answer what we want to know?
3. How to build it? Country example?
4. How can modelling support you in policy making?

What is it we want to know?

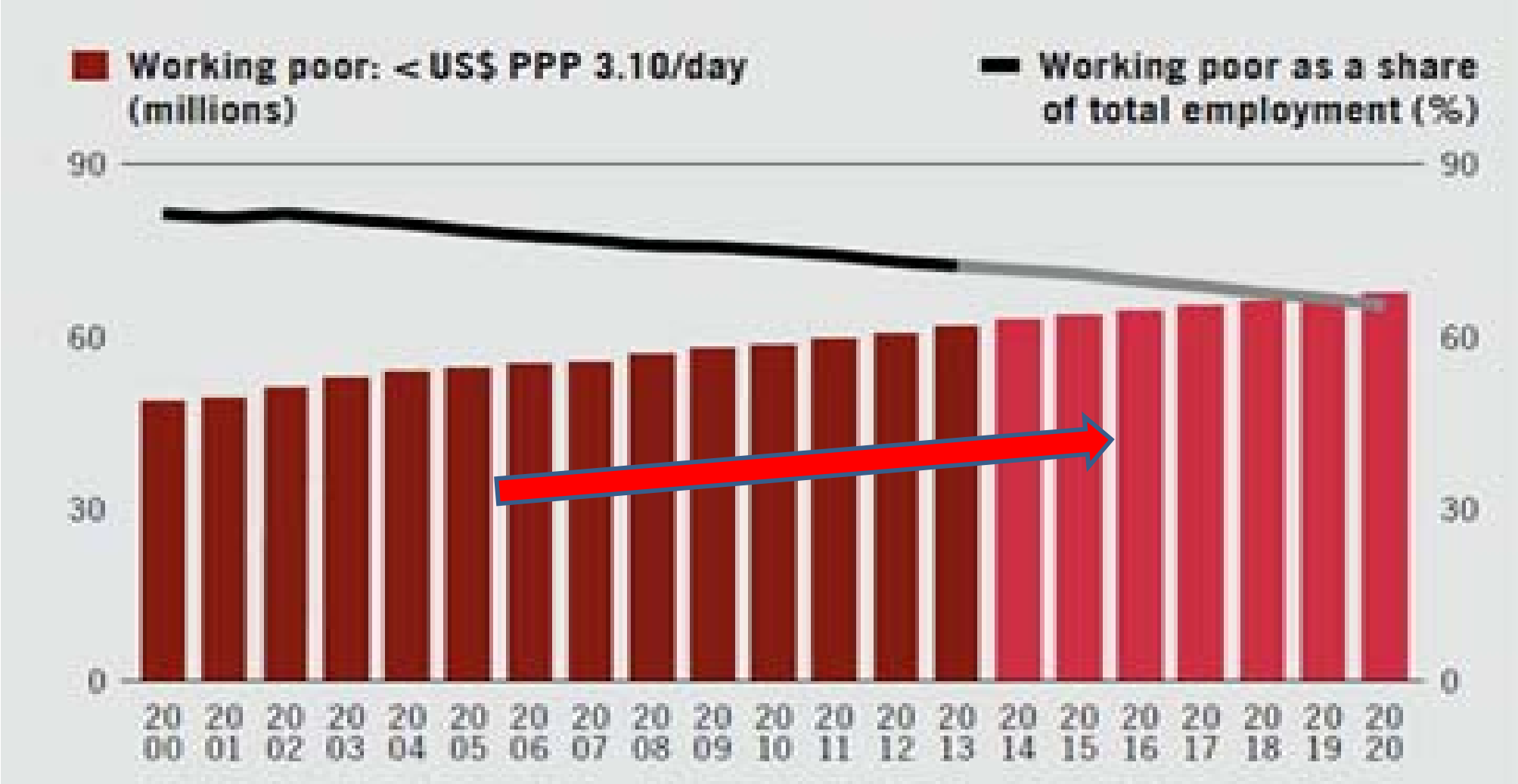
Total energy emissions Africa (ktCO2eq)



… causes the climate to change, we have to reduce emissions and adapt!

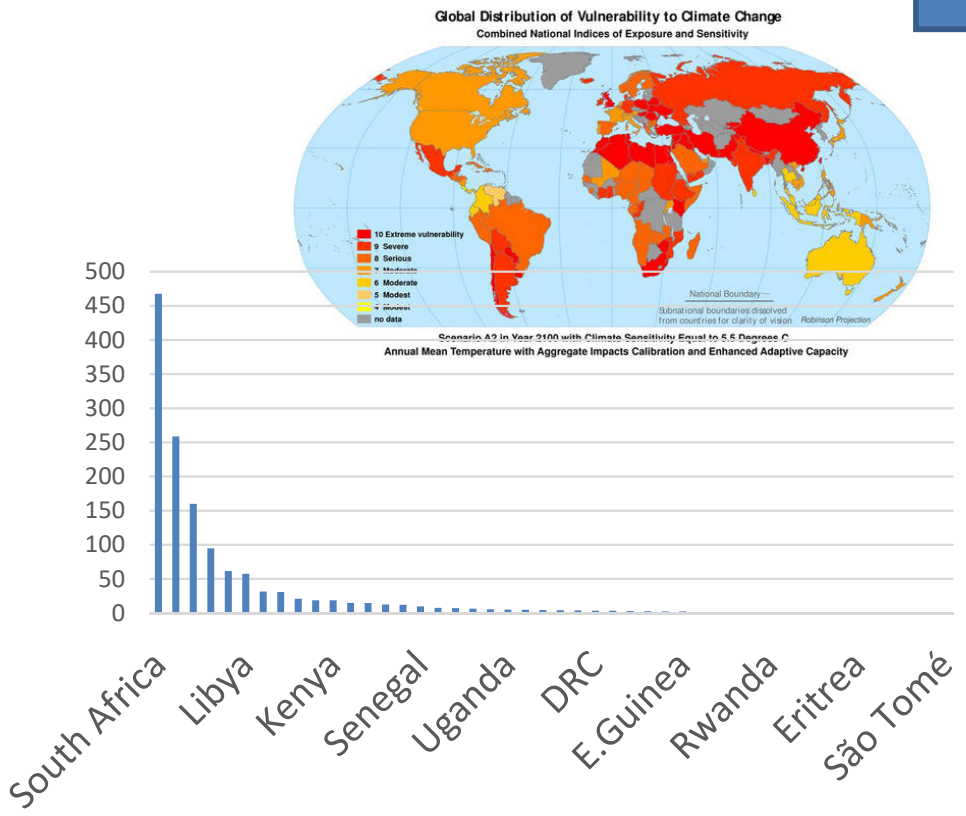


At same time, there is still poverty, unemployment, inequality rising…

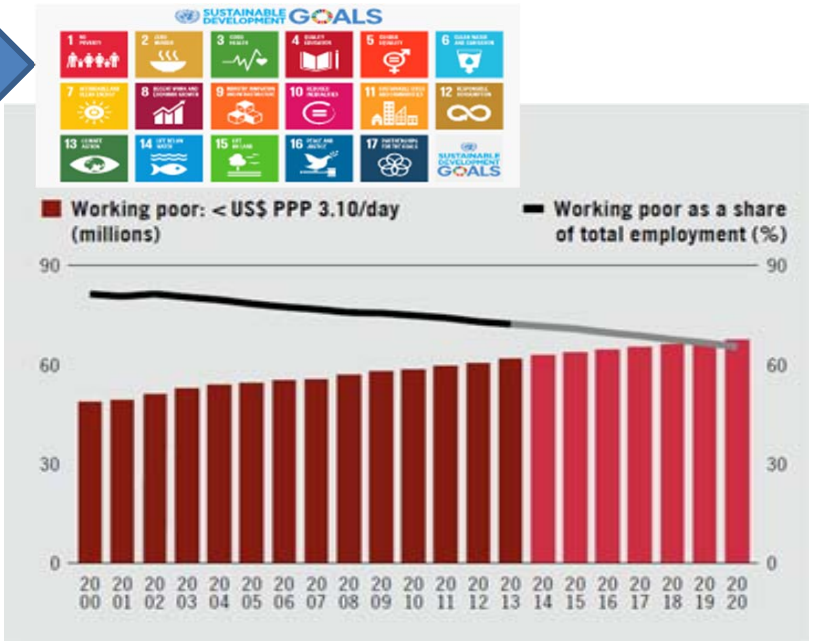


In short, we want to know:

How climate polices (mitigate & adapt!) impacts on…



…jobs, poverty, GDP, inequality & SDGs



Just Transition Policies min negative max gains!

Which model helps us to answer what we want to know?

Relevant modeling frameworks

1. Input Output and Social Accounting Matrix for multiplier analysis and short term simulations
2. Structural Multisectoral Simulation Models based on Input Output or Social Accounting Matrices
3. Computable General Equilibrium Models (CGE) based on Input Output or SAM
4. System Dynamics aggregate, long term & feedback loops
5. Econometric

Desirable properties of models

1. Include Economic, Environment and Social dimension, realistic features of the labour market.

2. Allow for **unemployment** or **underemployment, formal and informal**

3. Social outcomes of **inequality and distribution** need to feedback on demand **-> because this is reality.**

4. Country and sector specific: Market adjustment tailored to the sectoral characteristics. Beyond statistics, input output and multiplier analysis there is **no universal blueprint.**

Input Output based models have the desired properties:

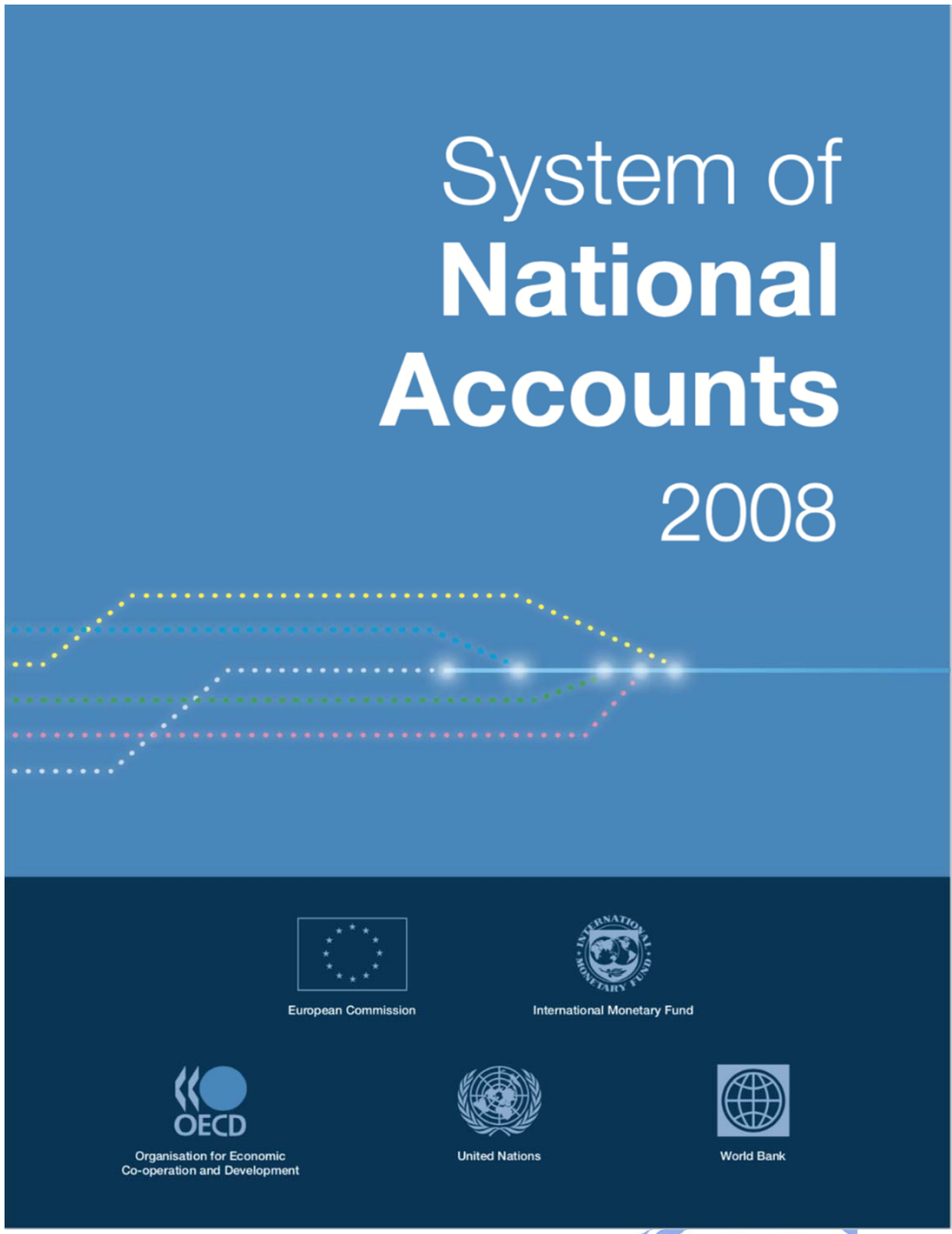
- They are based on economic statistics following the System of National Accounts (SNA)
- Economic sectors are highly disaggregated by the International Standard Classification of Industries (ISIC) (up to 4 digit level)
- AND, they allow the integration of environment and social statistics

How do we build the model?

Economic data

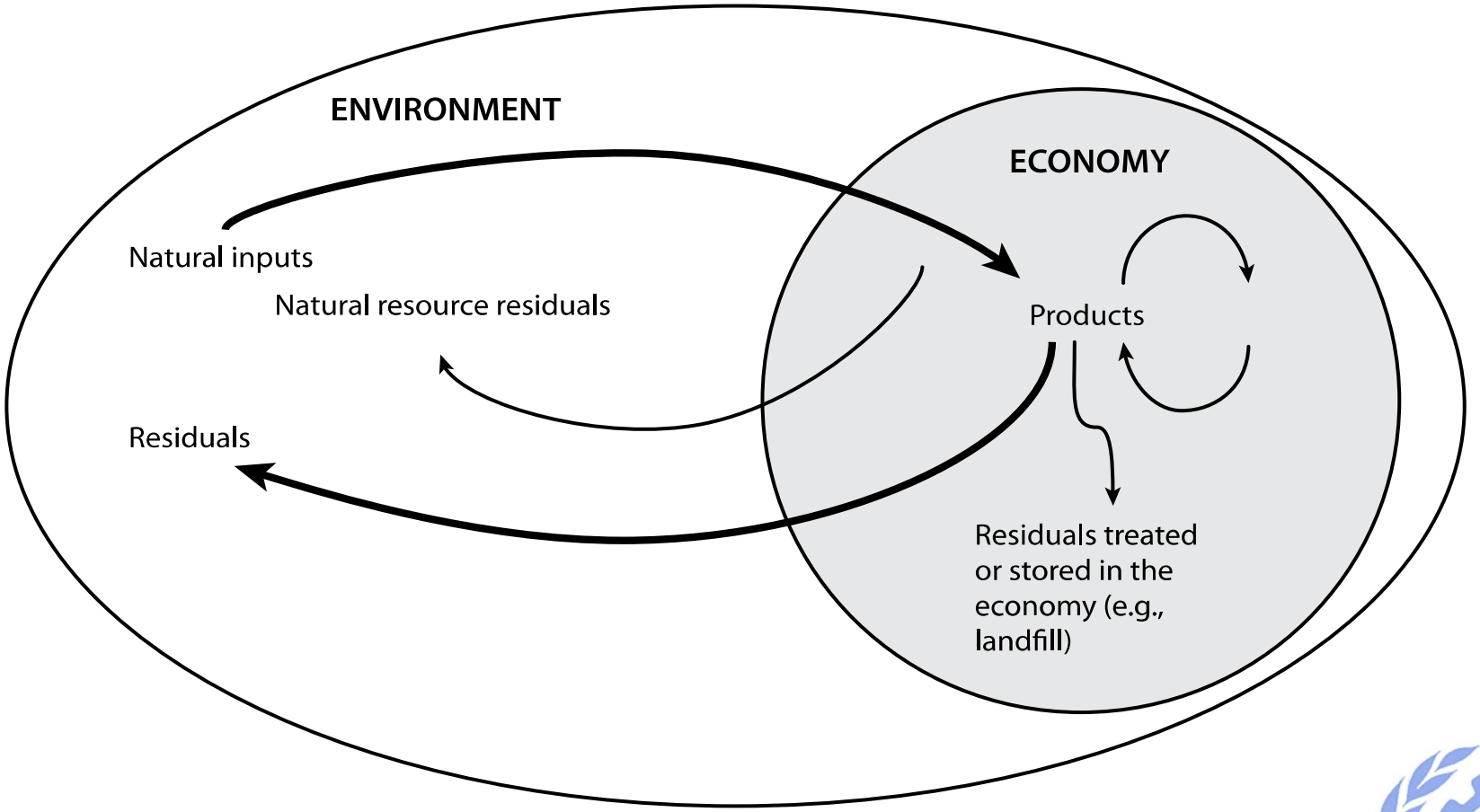
- Economic growth
- Consumer spending
- Government debt
- Investment
- Prices
- Taxes
- Profits

- Drawing a picture of the economy
- High sector disaggregation by ISIC
- Actors: institutional sectors
- Transactions
- Money flows – direction of arrows
- Exchanges
- Transfers



But in traditional economic accounting the environment is not reflected and must be integrated

Physical flows in relation to the production boundary of the economy



Economic AND Environmental data

- ✓ SEEA framework adopted by UN
- ✓ A statistical system with economic and environmental information into a **common framework** to measure -> *the contribution of the environment to the economy*, and -->*the impact of the economy on the environment*
- ✓ Better informed decision-making.

Social & Decent Work data

1 – Employment-to-population ratio

2 – Unemployment rate

3 – Youth not in education or employment

4 – Informal employment

5 – Working poverty rate

Based on international labour standards:

GUIDELINES FOR PRODUCERS AND USERS OF STATISTICAL AND LEGAL FRAMEWORK INDICATORS, ILO MANUAL , Sept.2013

available at http://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/publication/wcms_223121.pdf

6 – Low pay rate (below 2/3 of average hourly earnings)

7 – Excessive hours (more than 48 hours per week)

8 – Incidence of children in child labour

9 – Precarious employment rate

10 – Occupational segregation by sex

11 – Female share of employment in ISCO-08 sub-major groups 11,12 and 13

12 – Occupational injury rate, fatal

13 – Share of population above a specified age benefiting from a pension

14 – Public social security expenditure (% of GDP)

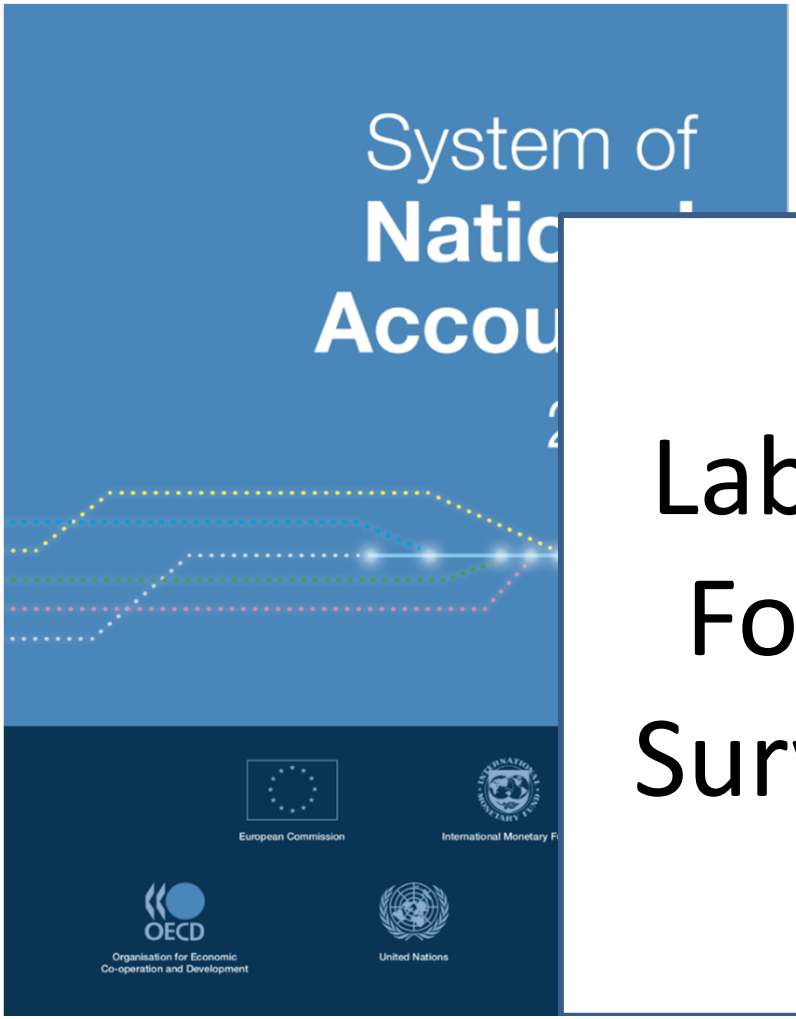
15 – Union density rate

16 – Enterprises belonging to employer organization [rate]

17 – Collective bargaining coverage rate

18 – Indicator for Fundamental Principles and Rights at Work (to be developed)

With multiple social, economic and environment policy questions statistics need to be combined!

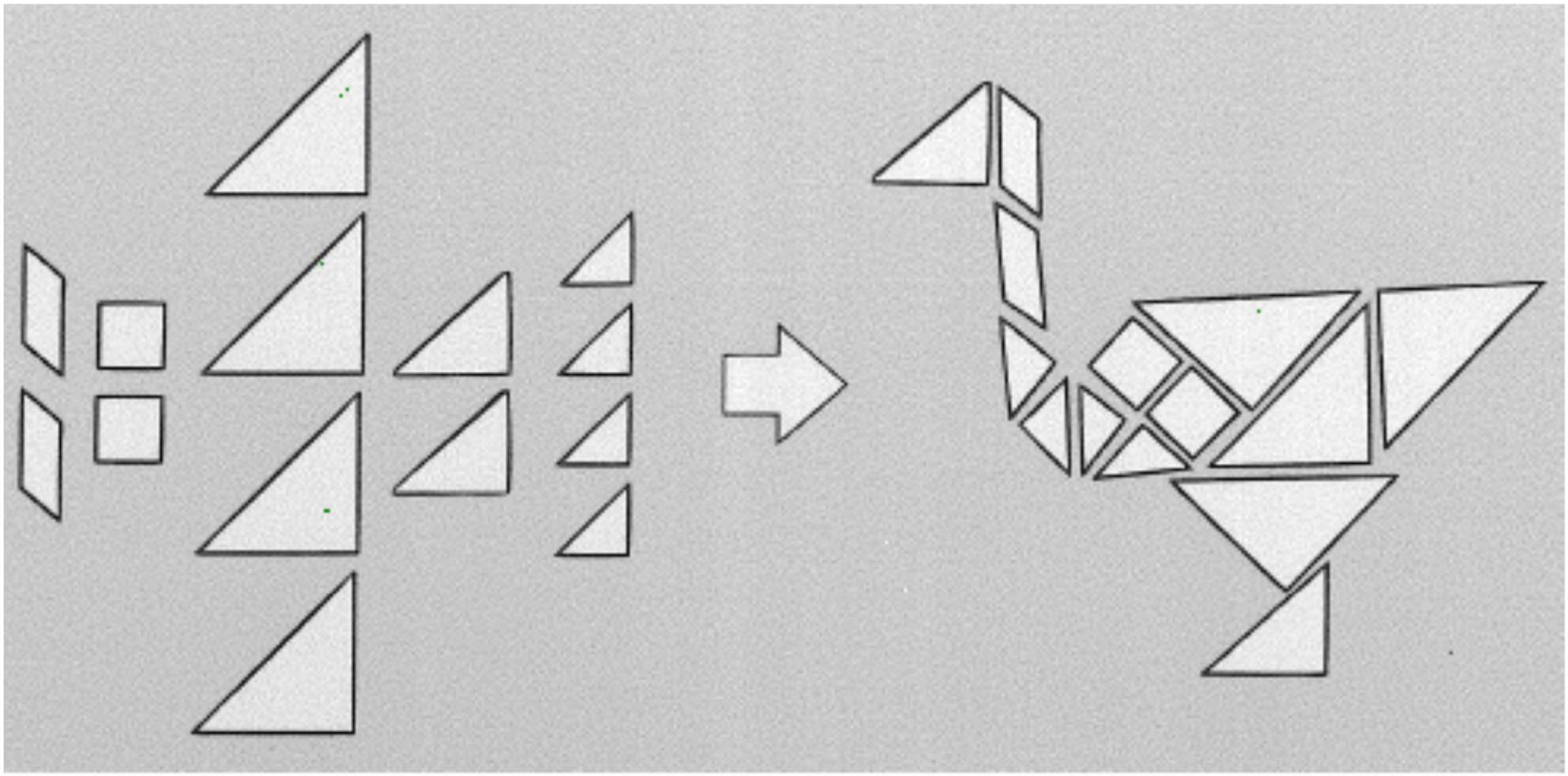


Labour Force Surveys

Household Budget Survey

Environment Assessment

How to get from Statistics to Integrated Information?



Statistics **Integrated information**

Source UNSD

The Input-Output table provide an integrated data framework to combine data in a systematic way

		Sector			Final demand (f)			Total output
		Agricul-ture	Industry	Services	Household consump-tion	Invest-ment	Govern-ment consump-tion	
Sector	Agric.	z_{11}	z_{12}	z_{13}	C_1	I_1	G_1	x_1
	Industry	z_{21}	z_{22}	z_{23}	C_2	I_2	G_2	x_2
	Services	z_{31}	z_{32}	z_{33}	C_3	I_3	G_3	x_3
Value added	Wages	w_{L1}	w_{L2}	w_{L3}				
	Profits	w_{K1}	w_{K2}	w_{K3}				
Net taxes on prod.		t_1	t_2	t_3				
Total output		x_1	x_2	x_3				
Employment		*emp 1*	*emp 2*	*emp 3*				
CO2 Emissions		*e 1*	*e 2*	*e 3*				

With integrated statistics we can now quantify climate policy's impact on SDGs

1. CO2 per unit GDP/resource intensity (e.g. water and energy productivity, waste and emission intensity)

2. Production & employment by industry & green industry (e.g. contribution of green activities to GDP)

3. Environmental taxes & subsidies and similar transfers (e.g. environmental taxes to GDP)

4. Environmental assets and their role in the economy (e.g. changes in stocks of natural resources, depletion)

Country example?

From statistics to simple IO model

Direct and indirect emission & employment multipliers

Alternative Green technology

(14)

- Additional 11 indirect jobs in mining, manufacturing, retail etc (1)
- And 1 ton indirect CO2

(22)

- Requires 21 direct jobs in construction
- Generates 11 tons CO2 (2)

Value of 100,000

Job creation - green vs conventional

Net gain of 31,000 direct & indirect jobs if green construction is favoured

Example NDC: reduce CO2 per unit GDP (in construction)

IF GDP in construction grows by 10 million:

- Conventional: 90 Jobs created and 13.4 tCO2
- Green: 120 Jobs created and 4.3 tCO2

➢ CO2 intensity of GDP (in million peso) decreases from 1.3 to 0.4

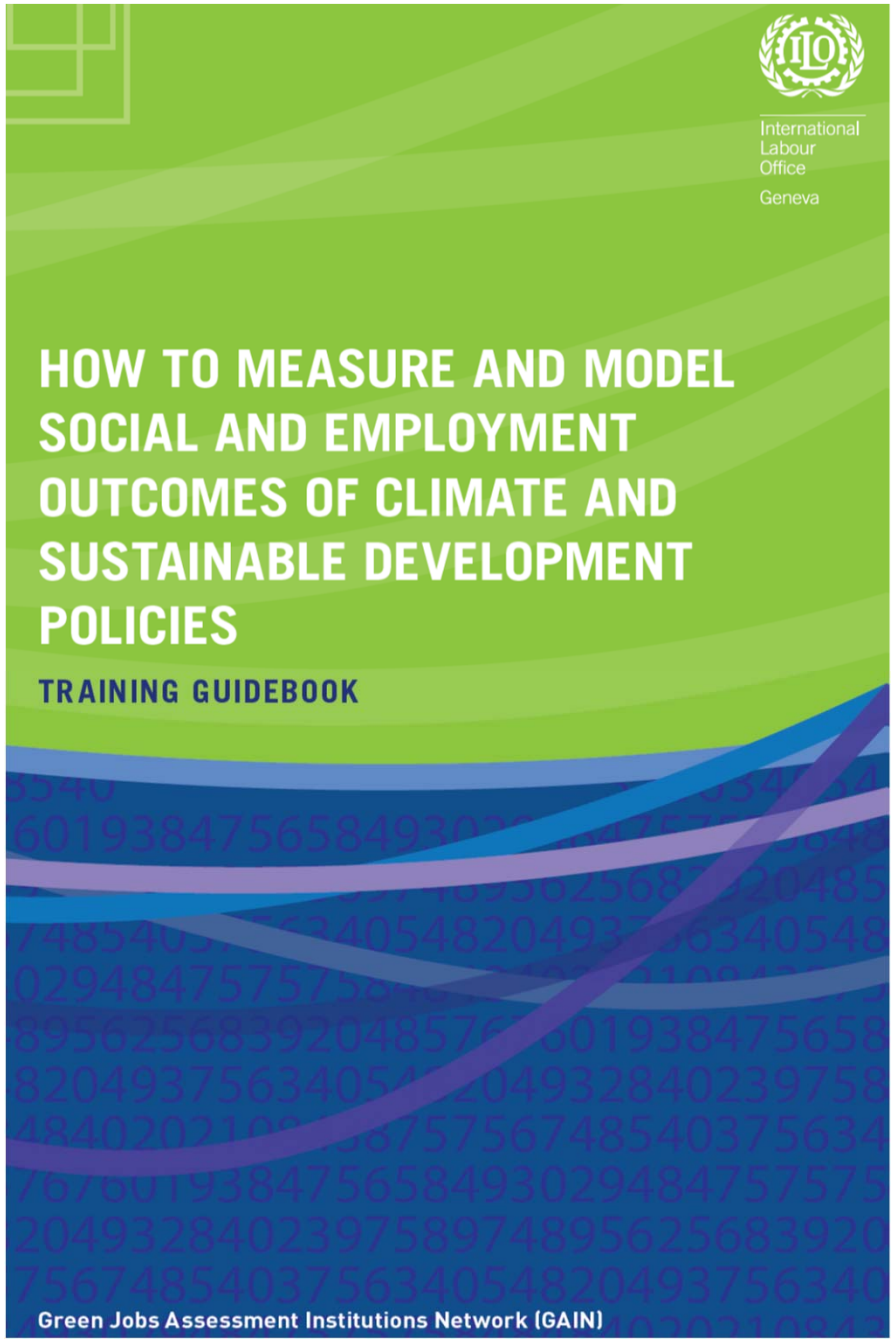
➢ But only if just transition policies: Skills and Social Protection, Jobs targeted at unemployed, disadvantaged and poor!

How can model support you in policy making back home?

Build your model! ILO assistance

- ✓ Open source methodology Training Guide published
- ✓ Based on national data and needs

- ✓ Capacity building of Government & national institutions
- ✓ To <u>build and run your own national model</u>



GAIN members will support you

33 Members: Research Institutes, Researchers and International Organisations

Binzagr Institute for Sustainable Prosperity
People. Planet. Prosperity.

cambridge econometrics
clarity from complexity

Global Green Growth Institute

THE WORLD BANK

GLIS

NCAER SINCE 1956 QUALITY. RELEVANCE. IMPACT

SINTEF
Technology for a better society

ENVIRONMENTAL PROTECTION AGENCY, GHANA

ZIPAR
Zambia Institute for Policy Analysis & Research

IGES
Institute for Global Environmental Strategies

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

EPCRC

UNRISD
United Nations Research Institute for Social Development

United Nations
Framework Convention on
Climate Change

UNITED NATIONS UNIVERSITY
UNU-INRA
Institute for Natural Resources in Africa

PERI
University of Massachusetts Amherst

RUTGERS
Edward J. Bloustein School
of Planning and Public Policy

UC BERKELEY
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GREEN ECONOMY PROGRAM

Let's get started!

- ✓ Let's learn how it works over the next 4 days
- ✓ Set up a technical team back home with Research, Statistics and Policy makers
- ✓ Build and use the model for evidence based policy making
- ✓ Design climate policies which create jobs, provide protection and promote development

As a first step, let's ask policy makers!

What is it you want to know:

WHICH policy issues are key in your country?

Excercise

What is the main policy question?	Which Sectors are the focus?	Which outcome indicators to analyse?

References

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- Eurostat, Office for Official Publications of the European Communities. 2008. *Eurostat manual of supply, use and input–output tables* (Luxembourg).
- Miller, R.A.; Blair, P.D. 2009. *Input–output analysis: foundations and extensions*. 2nd edition (Cambridge, UK, Cambridge University Press).
- United Nations, European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development, World Bank. 2009. *A system of National Accounts 2008 (SNA 2008)* (New York).
- United Nations, forthcoming. *United Nations handbook on supply, use and input-output tables with extensions and applications* (New York).

Ex. IO integrated model Germany

INPUT-OUTPUT TABLE (Billions of Euro)

			PRODUCTS						FINAL USE					Total output at basic prices
									Final consumption		Gross fixed capital formation	Changes in inventories	Exports	
			Agricul-ture	Manufac-turing	Construc-tion	Trade, trans.and comm.	Finance and business service	Other services	Households	Governmnet				
No.	PRODUCTS		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1)	Agriculture	Domestic	3	20				1	9			3	5	42
(2)	Manufacturing	Domestic	7	394	48	56	11	30	250	7	95	- 58	611	1 451
(3)	Construction	Domestic	1	11	18	8	28	10	5		153		1	234
(4)	Trade, transport and comm.	Domestic	4	139	17	181	38	40	317	15	39	6	111	907
(5)	Finance and business services	Domestic	6	131	30	124	261	51	313	3	25		66	1 010
(6)	Other services	Domestic		18	3	12	17	47	147	472	2		2	721
(7)	Total at basic prices		21	713	116	382	355	179	1 041	497	314	- 49	795	4 365
(8)	Agriculture	Imported	1	11				1	8			1	2	23
(9)	Manufacturing	Imported	4	246	15	21	3	12	111	7	57	27	160	664
(10)	Construction	Imported							1			3	20	25
(11)	Trade, transport and comm.	Imported		9	1	31	4	2						47
(12)	Finance and business services	Imported		16	1	6	24	5	8	2	4		8	73
(13)	Other services	Imported						1						1
(14)	Imports		5	283	17	58	31	21	128	9	61	31	189	833
(15)	Taxes less subsidies on products		2	10	2	12	17	24	151	6	34			257
(16)	Total at purchasers' prices		27	1 007	135	452	402	224	1 319	513	409	- 18	984	5 455
(17)	Compensation of employees	Value add.	6	308	69	294	191	364						1 232
(18)	Other taxes less subsidies on production	Value add.	- 6	- 2		- 1	5	- 7						- 12
(19)	Consumption of fixed capital	Value add.	8	79	5	60	160	63						375
(20)	Net operating surplus/Net mixed income	Value add.	7	60	25	101	252	77						523
(21)	GVA		15	445	99	454	608	497						2 117
(22)	Total input at basic prices		42	1 451	234	907	1 010	721	1 319	513	409	- 18	984	

EMPLOYMENT (1,000 persons)											
(29)	Wage and salary earners	295	6 787	1 948	9 821	5 693	11 356				35 900
(30)	Self-employed	359	275	463	1 297	1 017	1 059				4 470
(31)	Total	654	7 062	2 411	11 118	6 710	12 415				40 370
ENERGY (Petajoule)											
(32)	Coal and coal products		1 714	1	1		6	17	- 41	40	1 738
(33)	Brown coals and lignite products		1 617				1	21	- 9	24	1 654
(34)	Crude oil		4 294						- 7	5	4 291
(35)	Gasolines	3	91	4	25	20	15	868	4	248	1 278
(36)	Diesel fuels	106	123	79	476	93	74	387		355	1 693
(37)	Jet fuels				434		4		10	176	624
(38)	Heating oil, light	25	188	14	87	26	85	514	13	100	1 052
(39)	Fuel oil, heavy		336		17				- 13	217	557
(40)	Other petroleum products	2	1 190	101	35	2	3	48	- 1	161	1 540
(41)	Natural gas and other gases	12	1 797	12	125	49	184	936	228	465	3 808
(42)	Renewable Energy	6	1 178	5	45	7	6	299	1	18	1 564
(43)	Electric power and other energy	23	2 641	14	289	76	197	678	127	198	4 242
(44)	Total	178	15 167	230	1 535	273	574	3 767	311	2 006	24 043
EMISSIONS (1,000 tons)											
(45)	Carbon dioxide (CO2)	9 260	550 893	9 162	80 990	12 077	24 173	222 268			908 823
(46)	Methane (CH4)	1 247	925	1	49	3	10	79			2 313
(47)	Nitrous oxide (N2O)	137	62		2			4			206
(48)	Nitrogen oxides (NOx)	153	538	46	398	33	45	314			1 526
(49)	Sulfur dioxide (SO2)	3	373	1	41	2	8	42			469
(50)	Organic compounds (NMVOC)	13	574	6	40	3	7	310			952
(51)	Ammonia (NH3)	541	16		2			20			579
(52)	Particulate matter (PM10)	47	42	7	43	2	3	48			192
(53)	Hydroflurocarbons (HFC)		12								12
(54)	Perflurorocarbons PFC										
(55)	Sulfur hexafluoride (SF6)										
(54)	Total	11 402	553 435	9 222	81 565	12 120	24 246	223 084			915 073
GLOBAL WARMING AND ACID DEPOSITION (1,000 tons)											
(55)	Greenhouse gases 1)	77 990	589 463	9 232	82 710	12 195	24 482	225 115			1 021 188
(56)	Acid deposition 2)	110	749	33	320	25	39	261			1 537
(57)	Tropospheric ozone formation 3)	1 413	2 036	52	487	38	61	703			4 792
WASTE, SEWAGE AND WATER											
(58)	Waste (1.000 tons)	804	122 849	194 098	4 945	5 510	3 931	36 033			368 171
(59)	Sewage (Mio. cbm)	21	26 970	38	173	193	137	3 118			30 650
(60)	Water from waterworks (Mio. cbm)	136	- 3 725	14	194	216	154	3 011			
(61)	Water from nature (Mio. cbm)	303	37 608	25	9	10	7	25			37 986

- https://www.youtube.com/watch?v=27wTSQiGku0&feature=youtu.be