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Prototype model for Sustainable Development Goal simulation

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Note: The opinions expressed in this document are those of the authors and do not necessarily reflect the views of ESCWA.

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Preface

The present report reviews recent efforts to develop a quantitative tool (model) that arbitrates between conflicting SDGs to find the best combinations of targets.

Part I examines the reasons for using a quantitative tool to integrate SDGs into economic planning. Part II reviews the potential use of such a tool, before suggesting a prototype. The complex relationships between targets suggest a strong link between SDGs that could lead to a negative reciprocal influence. Therefore, policymakers require a quantitative tool to find the combinations of SDG targets that best serve their objectives. Part III explains the analytical structure of the model, before introducing its interface. The theoretical structure of the core model is introduced first, followed by an illustration of the relationships between the value of each SDG target and the other SDG values, as well as other economic and social variables. Part VI reviews and explains the technical aspects of the model interface. It lists the system's prerequisites, limitations, hardware requirements and basic troubleshooting techniques, and the folder's structure.

The report concludes by listing the roles that the Economic and Social Commission for Western Asia (ESCWA) can play in developing this framework.

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Abbreviations and explanaotry notes

AIDS	Acquired Immunodeficiency Syndrome
AOI	Agriculture Orientation Index
ARV	Antiretroviral
ATM	Automated Teller Machine
CBB	Central Bank of Bahrain
CET	Output Transformation
CGE	Computable General Equilibrium
CO2	Carbon Dioxide
DAC	Development Assistance Committee
ESCWA	Economic and Social Commission for Western Asia
FGM/C	Female Genital Mutilation/Cutting
FIES	Food Insecurity Experience Scale
GAMS IDE	General Algebraic Modeling System
GDP	Gross Domestic Product
GFLI	Global Food Loss Index
GHG	Greenhouse Gases
GNI	Gross National Income
HIV	Human Immunodeficiency Virus
ICM	Integrated Costal Management
ICT	Information and Communication Technologies
IDE	Integrated Development Environment
ILO	International Labor Organization
IP	Internet Protocol
IPA	Indicator of Price Anomalies
IWRM	Integrated Water Resource Management
LCU	Local Currency Units
LDCs	Least Developed Countries
M&E	Monitoring and Evaluation
MDGs	Millennium Development Goals

Abbreviations and explanaotry notes (*continued*)

AIDS	Acquired Immunodeficiency Syndrome
MF	Material Footprint
MHT	Medium and High-Tech
MSP	Maritime Spatial Planning
NEET	Not in Education, Employment or Training
ODA	Official Development Assistance
OECD	Organization for Economic Cooperation and Development
PC	Personal Computer
pH	Potential of Hydrogen
PM	Particulate Matter
PPP	Purchasing Power Parity
SAM	Social Accounting Matrix
SD	Standard Deviation
SDGs	Sustainable Development Goals
SEEA	System of Environmental-Economic Accounting
TB	Tuberculosis
TCI	Total Capital Inflow
TFC	Thin Film Composite
TRIPS	Trade-Related Aspects of Intellectual Property
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
WIPO	World Intellectual Property Organization

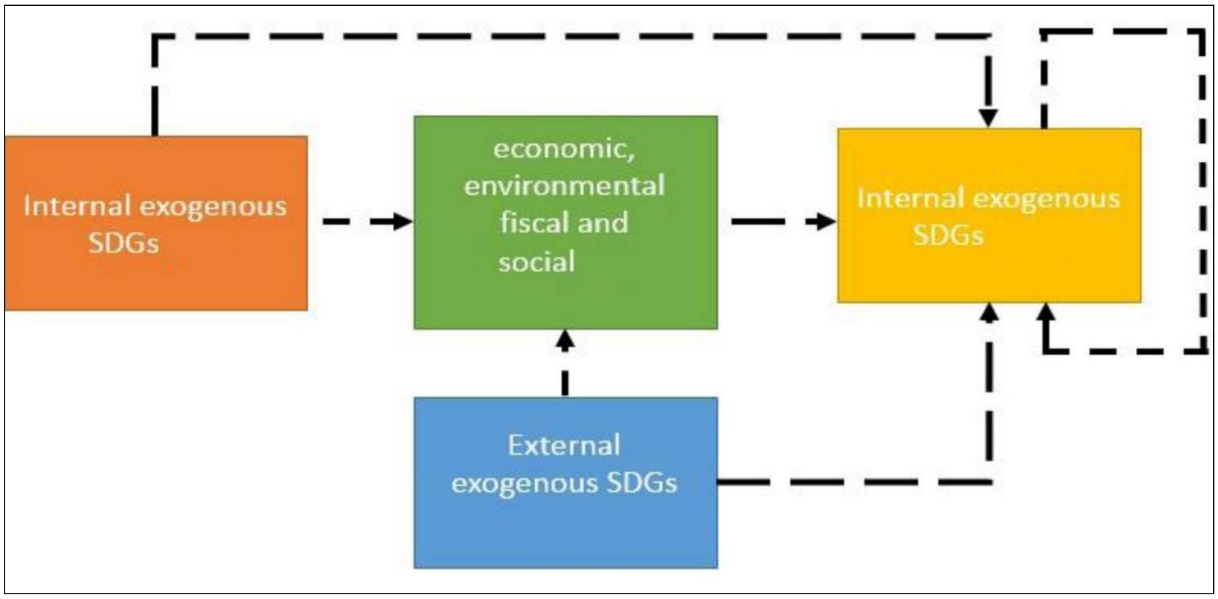
References to dollars ($) are to United States dollars, unless otherwise stated.

I. WHY WE SHOULD USE A QUANTITATIVE TOOL TO INTEGRATE SDGS INTO ECONOMIC PLANNING

The Sustainable Development Goals (SDGs) are a set of 17 intergovernmental aspirational goals with numerous targets and indicators, covering a broad range of economic, social, environmental and governance issues. In terms of strategic planning, the SDGs can be divided into the following three categories: internal exogenous SDGs (annex I) that can be directly controlled by policymakers and can affect the economy, such as the budget allocated to health, education, governance and subsidies; external exogenous SDGs (annex II) that cannot be directly controlled by policymakers but can affect the economy; and endogenous SDGs (annex III) that cannot be directly controlled by policymakers but can be affected by other parameters and variables under government control which could affect the rest of the economy.

Analysing the complex relationships between targets shows that SDGs are vastly interlinked and connected to other economic, environmental, fiscal and social variables (figure 1). Some variables are linked to the sectoral structure of the economy (tourism value added, manufacturing employment as a percentage of total employment, percentage share of medium and high-tech industry value added in total value added, etc.), the structure of public expenditure (social protection, subsidies, health, transport, etc.), and public finance (composition of tax revenues as a percentage of gross domestic product (GDP), debt service as a percentage of exported goods and services, etc.). Other variables are linked to social dimensions (proportion of population living below the national poverty line disaggregated by sex and age group, proportion of the population living in households with access to basic services, etc.) and environmental dimensions (carbon emission per unit of value added, forest area as a percentage of total land area, etc.).

Figure 1. Interrelationships of SDGs and other variables



Unlike the Millennium Development Goals (MDGs), SDGs are not all positively correlated. Some targets can negatively influence others, thus requiring policymakers to undertake a certain arbitrage. For example, an increase in manufacturing value added could generate an increase in fossil fuel consumption, thus reducing the amount of fossil fuel subsidies. Similarly, in the absence of adequate economic restructuring, an increase in total government spending on social protection and employment programmes increases the public deficit and, in turn, increases debt services.

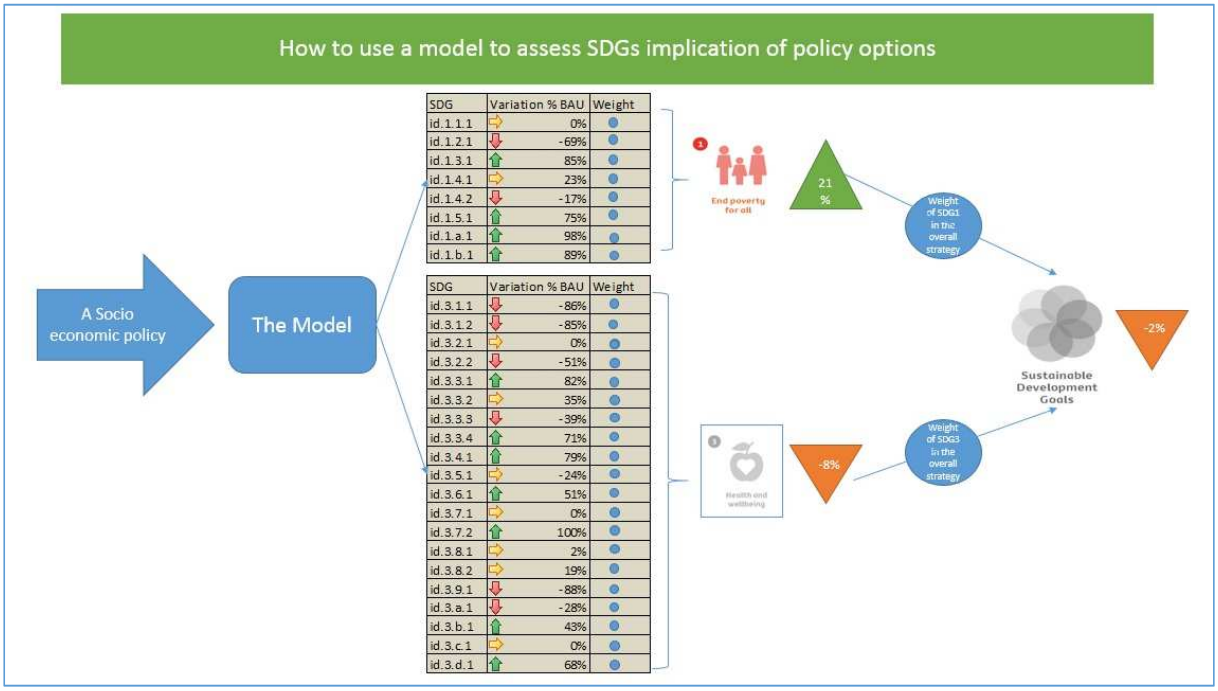
II. HOW TO USE A MODEL TO ASSESS THE IMPLICATIONS OF POLICY OPTIONS ON SDGS

Since SDGs are strongly interlinked and can negatively influence one another, policymakers need a quantitative tool to help them engineer combinations/clusters of targets that best serve their requirements. This tool could be a computable general equilibrium (CGE) model that can link SGDs to each other and to various economic, fiscal, environmental and social variables, taking into account the sectoral structure of the economy (figure 2).

Such a tool would allow policymakers to assess the implications of public policies on each SDG. The CGE model would show how policies could have positive implications on some targets and negative implication on others. To gauge the overall implications of a policy, it is necessary to produce a weighting system that translates government priorities into quantitative numbers, and conduct the necessary arbitrage using *ex-ante* assessments.

Policymakers can use the CGE model to decide on the optimal combinations/clusters of SDG targets by assessing the impact of each variation, whether in the indicators or the weights, on the end result.

Figure 2. Assessment model of policy implications on SDGs



III. SDG SIMULATOR PROTOTYPE: ANALYTICAL STRUCTURE

The model proposed is a standard CGE model developed by ESCWA, with an incorporated SDG block. The data and the elasticities used in this illustrative example are archetypal and will need detailed analysis and estimation when the model is applied to a specific economy.

A. CORE MODEL

The present section sets out the theoretical structure of the model.

1. *Price block*

Different prices are defined due to the assumed quality differences among commodities of different origins and destinations: exports, imports and domestic outputs used domestically.

Import price: The import price in local-currency units (LCU) is the price paid by domestic users for imported commodities (exclusive of the sales tax). It is based on the world price of these imports, factoring in the exchange rate and import tariffs plus transaction costs (the cost of trade inputs needed to move the commodity from the border to the consumer) per unit of the import. The exchange rate and the domestic import price are flexible (variables), while the tariff rate and the world import price are fixed (parameters). World import prices are fixed due to the "small-country" assumption.

$$(1)\quad PIMP_{C,R,t} = pwm_{C,R,t}\left(1 + tm_{C,R,t}\right)\ EXR_t\ + \sum_{CT}(PDEM_{CT,t}\ icm_{CT,C})$$

Where: $PIMP_{C,R,t}$ is the price of imports of commodity C from region R: $pwm_{C,R,t}$ is the world price of import of commodity C from region R: $tm_{C,R,t}$ is the rate of import tariff: EXR_t is the exchange rate: $PDEM_{CT,t}$ is the price of composite good C, and $icm_{CT,C}$ is the amount of transport commodities used for a unit of imports of product C.

Export price: The export price in LCU is the price received by domestic producers when they sell their output in foreign markets. Taxes and trade cost inputs reduce the price received by the domestic producers of exports. The domain of the equation is the set of exported commodities, all of which are produced domestically.

$$(2)\quad PEXP_{C,R,t} = pwe_{C,R,t}\left(1 - te_{C,R,t}\right)\ EXR_t\ - \sum_{CT}(PDEM_{CT,t}\ ice_{CT,C})$$

Where $PEXP_{C,R,t}$ indicates price of exports of commodity C to region R; $pwe_{C,R,t}$ indicates world price of exports of commodity C to region R; $te_{C,R,t}$ indicates export tax and $ice_{CT,C}$ is the amount of transport commodities used for a unit of exports of product C.

Demand price of domestic non-traded goods: The model includes distinct prices for domestic output used domestically. In the presence of transaction costs, it distinguishes between prices paid by consumers and those received by suppliers. Equation (3) defines the demand prices as the supply price plus the cost of trade inputs per unit of domestic sales of the commodity in question.

$$(3)\quad PD_{C,t} = PDS_{C,t} + \sum_{CT}(PDEM_{CT,t}\ icd_{CT,C})$$

The notation $PD_{C,t}$ stands for demand price for commodity C produced and sold domestically, $PDS_{C,t}$ is the supply price for commodity C produced and sold domestically; and $icd_{CT,C}$ stands for the amount of transport commodities used for a unit of domestic consumption of product C.

Absorption: is expressed as the sum of spending on domestic output and imports at the demand prices, *PDD* and *PM*. The prices *PDD* and *PM* include the cost of trade inputs but exclude commodity sales tax (equation 4).

$$(4)\quad PDEM_{C,t}\left(1 - TQ_{C,t}\right)DEM_{C,t} = \ PD_{C,t}\ D_{C,t} + \sum_{R}(PIMP_{C,R,t}\ IMP_{C,R,t})$$

Where $TQ_{C,t}$ is the sales tax rate; $DEM_{C,t}$ indicates the quantity of composite goods supply; $D_{C,t}$ stands for the quantity of domestic sales, and $IMP_{C,R,t}$ is the quantity of imports**.**

Marketed output value: For each domestically produced commodity, the marketed output value at producer prices is stated as the sum of the values of domestic sales and exports. Domestic sales and exports are valued at the prices received by the suppliers, PDS and PEXP, both of which have been adjusted downwards to account for the cost of trade inputs.

$$(5) \qquad PYC_{C,t}\, YC_{C,t} = PDS_{C,t}\, D_{C,t} + \sum_R \left(PEXP_{C,R,t}\, EXP_{C,R,t}\right)$$

Where $PYC_{C,t}$ is the average output price; $YC_{C,t}$ indicates the quantity of aggregate marketed commodity output, and $EXP_{C,R,t}$ is the quantity of exports.

Output price: The gross revenue per activity unit, the activity price, is the return from selling the output or outputs of the activity, defined as yields per activity unit multiplied by activity-specific commodity prices, summed over all commodities. This allows for the fact that activities may produce multiple commodities.

$$(6) \quad PYA_{A,t} = \sum_C (PYAC_{A,C,t}\theta_{A,C})$$

Where $PYA_{A,t}$ is the output price of activity A, $PYAC_{A,C,t}$ stands for the price of commodity C from activity A, and $\theta_{A,C}$ is the share of commodity C produced by activity A.

Price of aggregate intermediate input: The activity-specific aggregate intermediate input price indicates the cost of disaggregated intermediate inputs per unit of aggregate intermediate input. It depends on composite commodity prices and intermediate input coefficients, which reflects the quantity of input commodity C per unit of aggregate intermediate input.

$$(7) \quad PINTA_{A,t} = \sum_C (PDEM_{C,t}\, ica_{A,C})$$

Where $PINTA_{A,t}$ indicates the price of intermediate aggregate, and $ica_{A,C}$ indicates the intermediate input C per unit of aggregate intermediate.

Value-added price: For each activity, total revenue net of taxes is fully exhausted by payments for value-added and intermediate inputs.

$$(8) \quad PVA_{A,t}\, VA_{A,t} = PYA_{A,t}\left(1 - ta_{A,t}\right)YA_{A,t} - PINTA_{A,t}INT_{A,t}$$

Where $PVA_{A,t}$ is the value added price; $VA_{A,t}$ indicates the quantity of aggregate value added; $ta_{A,t}$ is the tax rate on activity A; $YA_{A,t}$ stands for the level of domestic activity, and $INT_{A,t}$ is the quantity of aggregate intermediate input.

Consumer price index:

Equations (9) and (10) define the consumer price index and the producer price index for domestically marketed output.

$$(9) \quad CPI_t = \sum_C cwts_C PDEM_{C,t}$$

The notation CPI_t stands for consumer price index (PDEM-based), and $cwts_C$ stands for consumer price index weights.

Domestic producer price index:

$$(10) \qquad DPI_t = \sum_{CD} dwts_{CD} PDS_{CD,t}$$

Where DPI_t stands for index for domestic producer prices (PDS-based), and $dwts_{CD}$ stands for domestic sales price weights.

GDP: The Gross Domestic Product GDP_t is the sum of the gross value added by all resident producers in the economy.

(11) $GDP_t = \sum_A VA_{A,t}$

TFP computation:

(12) $A_{A,t}^{VA} = PGF_t$

Where $A_{A,t}^{VA}$ is the TFP factor by sector, and PGF_t is the is the TFP for the whole economy.

2. *Production block*

The production block covers the following four categories: domestic production and input use; the allocation of domestic output to home consumption, the domestic market and exports; the aggregation of supply to the domestic market (from imports and domestic output sold domestically); and demand for trade inputs generated by the distribution process. Production is carried out by activities that are assumed to maximize profits subject to their technology, taking prices for their outputs, intermediate inputs, and factors as given. It acts in a perfectly competitive setting. The CGE model includes the first-order conditions for profit-maximization by producers. Producers choose the optimal bundle between values added and aggregated intermediate inputs, which is modeled by the Leontief function.

Leontief technology – demand for aggregated intermediate input:

(13) $INT_{A,t} = inta_A YA_{A,t}$

Leontief technology – demand for aggregate value-added:

(14) $VA_{A,t} = iva_A YA_{A,t}$

Where iva_A is the aggregate value added coefficient

Value-added and factor demands:

Aggregated labour demand:

(15) $L_{A,t}^{AGG} = VA_{A,t}\, A_{A,t}^{va\,(\sigma_A^{va}-1)}\, (b^{va}\frac{PVA_{A,t}}{W_{A,t}^{AGG}})^{\sigma_A^{va}}$

The notation $L_{A,t}^{AGG}$ stands for Aggregated demand of labor force from activity A, and $W_{A,t}^{AGG}$ stands for Aggregated wages price.

Unskilled labour demand:

(16) $L\_UNS(A,t)\; L\_UNS(A,t) = L\_AGG(A,t)(b\_L\_AGG(A)\frac{W\_AGG(A,t)}{W\_UNS(A,t)}\sigma^{AGG\_L}(A)$

Skilled labour demand:

(17) $L_{SKL(A,t)} = L\_AGG(A,t)(b\_L\_AGG(A)\frac{W\_AGG(A,t)}{W\_SKL(A,t)}\sigma^{AGG\_L}(A)$

Where $L_{SKL(A,t)}$ stands for Aggregated demand of skilled labour force from activity A, and $W\_SKL(A,t)$ stands for aggregated wage of skilled labour force from activity A.

Capital demand:

(18) $$K_{A,t}^{AGG} = VA_{A,t}\, A_{A,t}^{va(\sigma_A^{va}-1)} \left(a^{va} \frac{PVA_{A,t}}{PK_{A,t}^{AGG}}\right)^{\sigma_A^{va}}$$

Where $K_{A,t}^{AGG}$ is the aggregated capital, and $PK_{A,t}^{AGG}$ is the price of aggregated capital.

(19) $$PVA_{A,t}\, VA_{A,t} = PK_{A,t}^{AGG}\, K_{A,t}^{AGG} + W_{A,t}^{AGG} L_{A,t}^{AGG}$$

(20) $$W_{A,t}^{AGG} = W_t^{Bar}$$

(21) $$\sum_A L_{A,t}^{AGG}\ (1 + UNEMP_{t)} = L_t^{tot}$$

Where $UNEMP_t$ is the unemployment rate by labour category, and L_t^{tot} is the total labour supply.

(22) $$K_{capital,A,t} = K_{A,t}^{AGG}\ (b^{K_{capital,A}^{AGG}} \frac{PK_{A,t}^{AGG}}{rK_{capital,A,t}})^{\sigma^{K_A^{AGG}}}$$

Where $K_{capital,A,t}$ is the capital level of sector A at time t

(23) $$PK_{A,t}^{AGG} K_{A,t}^{AGG} = \sum_{capital}(rK_{capital,A,t} K_{capital,A,t})$$

Commodity production and allocation: On the right-hand side, production quantities, disaggregated by activity, are defined as yields of time activity levels. On the left-hand side, these quantities are allocated to market sales and home consumption.

(24) $$YAC_{A,C,t} + \sum_H CHA_{A,C,H,t} = \theta_{A,C}\, YA_{A,t}$$

Where $YAC_{A,C,t}$ is the quantity of output of commodity C from activity A, and $CHA_{A,C,H,t}$ is the quantity consumed of home commodity C from activity A by household h.

Output aggregation function: Aggregate marketed production of any commodity is defined as a constant elasticity of substitution (CES) aggregate of the marketed output levels of the different activities producing the commodity.

(25) $$YC_{C,t} = A_C^{ac} \sum_A (b_{A,C}^{ac}\, YAC_{A,C,t}^{-\sigma_C^{ac}})^{1-\sigma_C^{ac}}$$

First-order condition for output aggregation function: The optimal quantity of the commodity from each activity source is inversely related to the activity-specific price.

(26) $$PYAC_{A,C,t} = PYC_{C,t} YC_{C,t} b_{A,C}^{ac} YAC_{A,C,t}^{\ -\sigma_C^{ac}-1} \sum_{AP} (b_{AP,C}^{ac}\, YAC_{AP,C,t}^{-\sigma_C^{ac}})^{-1}$$

Equation 26 is the first-order condition for maximizing profits from selling the aggregate output, $YC_{C,t}$, at the price, $YC_{C,t}$, subject to the aggregation function and the disaggregated commodity prices, $PYAC_{A,C,t}$

3. *Exports vs domestic supply*

Output transformation (CET) function: Equations (27) and (28) address the allocation of marketed domestic output to two alternative destinations: domestic sales and exports. Equation (29) reflects the assumption of imperfect transformability between these two destinations.

(27) $YC_{C,t} = A_C^{ac} \sum_A (b_{A,C}^{ac} YAC_{A,C,t}^{-\sigma_C^{ac}})^{1-\sigma_C^{ac}}$

(28) $YC_{C,t} = A_C^t \left(\sum_R (b_{C,R}^t EXP_{C,R,t}^{\sigma_C^t}) + \left(1 - \sum_R (b_{C,R}^t D_{C,t}^{\sigma_C^t}\right)\right)^{\frac{1}{\sigma_C^t}}$

Output transformation for domestically sold outputs and exports: This equation replaces the CET function for domestically produced commodities that do not have both exports and domestic sales. It allocates the entire output volume to one of these two destinations.

(29) $YC_{C,t} = D_{C,t} + \sum_R EXP_{C,R,t}$

Export-domestic supply ratio: Equation (30) defines the optimal mix between exports and domestic sales.

(30) $EXP_{C,R,t} = D_{C,t} \left(\frac{PEXP_{C,R,t}}{PDS_{C,t}} \frac{1-\sum_{RP} b_{C,R}^t}{b_{C,R}^t}\right)^{1/(\sigma_C^t - 1)}$

4. *Demand*

Disaggregated intermediate input demand: For each activity, the demand for disaggregated intermediate inputs is determined via a standard Leontief formulation as the level of aggregate intermediate input use multiplied by a fixed intermediate input coefficient.

(31) $IC_{C,A,t} = ica_{C,A} \, INT_{A,t}$

Where $IC_{C,A,t}$ is the quantity of intermediate demand for c from activity A and $ica_{C,A}$ is the intermediate input c per unit of aggregate intermediate consumption.

LES consumption demand by household h for marketed commodity c

(32) $PDEM_{C,t} \, CH_{C,H,t} = PDEM_{C,t} \, \gamma_{C,H}^m + \beta_{C,H}^m (EXPH_{H,t} - \sum_{CP} PDEM_{CP,t} \, \gamma_{CP,H}^m - \sum_{A,CP} PYAC_{A,CP,t} \gamma_{A,CP,H}^h$

Where $CH_{C,H,t}$ is the quantity consumed of marketed commodity C by household h. and $EXPH_{H,t}$ is the household consumption expenditure.

LES consumption demand by household h for home commodity c from activity a

It is assumed that each household maximizes a "Stone-Geary" utility function subject to a consumption expenditure constraint. The resulting first-order conditions, equations (5) and (6), are referred to as LES (linear expenditure system) functions since spending on individual commodities is a linear function of total consumption spending. Two functions are needed since household consumption is for the following two types of commodities: consumption of marketed commodities (purchased at market prices; equation 5), and consumption of home production (valued at their opportunity cost, the activity-specific producer price not including marketing costs; equation 6). Explicit demand functions may be derived by dividing both sides of each equation by the relevant price.

(33) $PYAC_{A,C,t}CHA_{A,C,H,t} = PYAC_{A,C,t}\gamma^{h}_{A,C,H} + \beta^{h}_{A,C,H}(EXPH_{H,t} - \sum_{CP} PDEM_{CP,t}\ \gamma^{m}_{CP,H} - \sum_{AP,CP} PYAC_{AP,CP,t}\gamma^{h}_{AP,CP,H}$

Investment demand:

Following the specification used in Mirage,[1] we suppose that private investment in each sector is mainly driven by capital return.

(34) $\left(\frac{INVP(FCAP,A,t)}{Klag(FCAP,A,t)}\right) = ID(t)\ AT\_INV(FCAP,A)\ (\mathrm{rk(FCAP,A,t)}^{\mathrm{sigma\_rk(FCAP,A)}}$

Where $INVP(FCAP,A,t)$ indicates private investment of activity A in factor FCAP; $Klag(FCAP,A,t)$ indicates demand of capital F from sector A at previous period; $ID(t)$ indicates interest rate; $INV(FCAP,A)$ indicates total investment of activity A in factor FCAP, and rk(FCAP, A, t) indicates price of capital F from sector A. Public investment by sector is supposed to be exogenous.

(35) $INVPUB(A,t) = \overline{INVPUB(A,t)}$

Government consumption demand:

(36) $PDEM_{C,t}\frac{G_{C,GOVF,t}}{EXPG_t - \sum_{INSDNG} trnsfr_{INSDNG,GOV,t}CPI_t - \sum_{A,F}(Prim_{F,A,t}-1)W_{F,A,t})} = PDEM0_C G0_{C,GOVF}/$
$(EXPG0 \ - \sum_{INSDNG} trnsfr_{INSDNG,GOV,2003}CPI0 \ - \sum_{A,F}(Prim_{F,A,2003}-1)W_{F,A,2003})$

Where $G_{C,GOVF,t}$ is the quantity of government consumption,

Capital good demand:

(37) $KG(C,t) = INVTOT(t)a_{INV(C)} \times \left(\frac{PDEM(C,t)}{PINVTOT(t)}\right)^{\sigma_c^{INV(c)}}$

Where $KG(C,t)$ is the quantity of fixed investment demand, $INVTOT(t)$ is the total investment at date t, and $PINVTOT(t)$ is the price of total investment.

Local versus imported demand (Armington) function:

Imperfect substitutability between imports and domestic output sold domestically is captured by a CES aggregation function in which the composite commodity that is supplied domestically is produced by domestic and imported commodities entering this function as inputs.

(38) $DEM_{C,t}=A_c^{DEM}\left(\sum_R b_{C,R}^{DEM}\ IMP_{C,R,t}^{-\sigma_c^{DEM}} + \left(1-\sum_R b_{C,R}^{DEM}\right)D_{C,t}^{-\sigma_c^{DEM}}\right)^{-1/\sigma_c^{DEM}}$

Where A_c^{DEM} is the shift parameter for Armington function and $b_{C,R}^{DEM}$ is the share parameter for Armington function.

[1] Bchir, M.H. and others, "Mirage, CGE Model for Trade Policy Analysis", CEPII Working paper 2002-2017, Centre d'Etudes Prospectives et d'Infromations Internationales, Paris, 2002.

Import-domestic demand ratio: Equation 39 defines the optimal mix between imports and domestic output.

$$(39) \quad \frac{IMP_{C,R,t}}{D_{C,t}} = \left(\frac{PD_{c,t}}{PIMP_{C,R,t}} \frac{b_{C,R}^{DEM}}{1-\sum_{RP} b_{C,R}^{DEM}}\right)^{\frac{1}{1+\sigma_C^{DEM}}}$$

Domestic demand:

$$(40) \quad DEM_{C,t} = D_{C,t} + \sum_R IMP_{C,R,t}$$

Demand for transactions services: Total demand for trade inputs is the sum of the demands for these inputs that are generated by imports, exports and domestic market sales.

$$(41) \quad TR_{C,t} = \sum_{CP} icd_{C,CP} D_{CP,t} + \sum_{CP,R} icm_{C,CP} IMP_{CP,R,t} + \sum_{CP,R} ice_{C,CP} EXP_{CP,R,t}$$

Where $TR_{C,t}$ stands for quantity of trade and transport demand for commodity C; $icd_{C,CP}$ is the trade input of C per unit of commodity CP produced and sold domestically; $\mathrm{ice_{C,CP}}$ is the trade input of C per unit of commodity CP exported and $\mathrm{icm_{C,CP}}$ is the trade input of C per unit of commodity CP imported.

5. *Institution block*

Factor income:

$$(42) \quad YF(F,t) = \sum_A \mathrm{W(F,A,t)Q(F,A,t)}$$

Where $YF(F,t)$ stands for factor income; $\mathrm{W(F,A,t)}$ stands for demand of labour F from sector A, and $\mathrm{Q(F,A,t)}$ stands for the quantity of factor F used in the production of product A.

Factor incomes to domestic institutions: The income of each factor is split among domestic institutions in fixed shares after payment of direct factor taxes and transfers to the rest of the world.

$$(43) \quad YIF_{INSD,F,t} = shif_{INSD,F}\left[\left(1 - tf_{f,t}\right) YF_{F,t} - trnsfr_{row,F,t} EXR_t\right]$$

Where $YIF_{INSD,F,t}$ is the income of institution from factor F;, $shif_{INSD,F}$ is the share of domestic institutions income of factor F; $tf_{f,t}$ is the rate of direct tax on factors (social security tax) ,and $trnsfr_{row,F,t}$ is the transfer of the revenue of factor F from the rest of the world.

Total incomes of domestic non-government institutions: The total income of any domestic non-government institution is the sum of factor incomes, transfers from other domestic non-government institutions, transfers from the government (indexed to the CPI), and transfers from the rest of the world.

$$(44) \quad YI_{INSDNG,t} = \sum_f YIF_{INSDNG,F,t} + \sum_{INSDNGP} TRII_{INSDNG,INSDNGP,t} + trnsfr_{INSDNG,GOV,t} CPI_t + trnsfr_{insdng,ROW,t} EXR_t$$

Where $YI_{INSDNG,t}$ is the income of (domestic non-governmental) institution INSDNG, and $TRII_{INSDNG,INSDNGP,t}$ is the transfers to domestic nongovernment institutions INSDNG from INSDNGP.

Transfers to institutions from institutions: Transfers between domestic non-government institutions are paid as fixed shares of the total institutional incomes net of direct taxes and savings.

$$(45) \quad TRII_{INSDNG,INSDNGP,t} = shii_{INSDNG,INSDNGP}\left(1 - to_{sav_{INSDNGP,t}}\right)\left(1 - Tax_{Dir_{INSDNGP,t}}\right) YI_{INSDNGP,t}$$

Where $shii_{INSDNG,INSDNGP}$ is the share of institution's INSDNG income in post-tax post-saved income of institution INSDNGP, $to_{sav_{INSDNGP,t}}$ is the marginal propensity to save for domestic institutions, and $Tax_{Dir_{INSDNGP,t}}$ is the rate of direct tax on domestic institutions INSDNGP.

Household consumption expenditures: Among the domestic non-government institutions, only households demand commodities. The total value of consumption spending is defined as the income that remains after direct taxes, savings, and transfers to other domestic non-government institutions.

$$(46) \quad EXPH_{H,t} = (1 - \sum_{INSDNG} INSDNG_H)\left(1 - to_{sav_{H,t}}\right)\left(1 - Tax_{Dir_{H,t}}\right)YI_{H,t}$$

Where $YI_{H,t}$s the income of household H

Total government income: Total government revenue is the sum of revenues from taxes, factors, and transfers from the rest of the world.

$$(47) \quad YG_t = \sum_{INSDNG} Tax\_Dir_{INSDNG,t} YI_{INSDNG,t} + \sum_f tf_{F,t} YF_{F,t} + \sum_A tva_{A,t} PVA_{A,t} VA_{A,t} + \sum_A ta_{A,t} PYA_{A,t} YA_{A,t} + \sum_{CM,R} tm_{CM,R,t} pwm_{CM,R,t} IMP_{CM,R,t} EXR_t + \sum_{CE,R} te_{CE,R,t} pwe_{CE,R,t} EXP_{CE,R,t} EXR_t + \sum_C TQ_{C,t} PDEM_{C,t} DEM_{C,t} + \sum_F YIF_{GOV,F,t} + trnsfr_{GOV,ROW,t} EXR_t$$

Where YG_t is the total current government income: $tva_{A,t}$ is the rate of value-added tax: $tm_{CM,R,t}$ is the; tariff applied on product CM imported from country R $pwm_{CM,R,t}$ is the free on board (FOB) price of such product; and $te_{CE,R,t}$ is the export tax rate applied on exports of commodity CE to country R and $pwe_{CE,R,t}$ is the FOB price of such product.

Total government expenditures:

$$(48) \quad EXPG_t = \sum_{C,GOVF} PDEM_{C,t} G_{C,GOVF,t} + \sum_{INSDNG} trnsfr_{INSDNG,GOV,t} CPI_t$$

Where $EXPG_t$ stands for total current government expenditure. Total government spending is the sum of government spending on consumption and transfers.

6. *System constraint block*

Composite commodity market equilibrium: (Goods and services market clearance). This equation imposes equality between quantities supplied and demanded of the composite commodity. The composite commodity supply, *DEM*, drives demands for domestic marketed output, *QD*, and imports, *QM*. The market-clearing variables are the quantities of import supply, for the import side, and the two interrelated domestic prices, *PDD* and *PDS*, for domestic market output.

$$(49) \quad DEM_{C,t} = \sum_A IC_{C,A,t} + \sum_H CH_{C,H,t} + \sum_{GOVF} G_{C,GOVF,t} + KG_{C,t} + qdst_{C,t} + TR_{C,t}$$

The notation $qdst_{C,t}$ stands for stock variation, and $TR_{C,t}$ is the demand addressed to the transport sector's current account balance for the rest of the world**.** The current-account balance imposes equality between a country's spending and its earning of foreign exchange. For the basic model version, foreign savings is fixed; the (real) exchange rate (*EXR*) serves the role of equilibrating variable to the current-account balance. The fact that all items except imports and exports are fixed means that, in effect, the trade deficit is also fixed. Alternatively, the exchange rate may be fixed and foreign savings unfixed. In this case, the trade deficit is free to vary.

(50) $\sum_{CM,R} pwm_{CM,R,t} IMP_{CM,R,t} + \sum_{F} trnsfr_{ROW,F,t} + \sum_{INSD} trnsfr_{ROW,INSD,t} + INTF_t = \sum_{CE,R} pwe_{CE,R,t} EXP_{CE,R,t} + \sum_{INSD} trnsfr_{INSD,ROW,t} + FSAV_t$

Where $INTF_t$ is the interest on foreign debt, and $FSAV_t$ is the foreign savings.

Government balance: The government balance imposes equality between current government revenue and the sum of current government expenditures (not including government investment) and savings.

(51) $GSAV_t = YG_t - EXPG_t - INVPUB_{tot_t} - INTF_t$

Where $GSAV_t$ is the government savings, and $INVPUB_{tot_t}$ is the total public investment.

Savings-investment balance: This equation states that total savings and total investment have to be equal. Total savings is the sum of savings from domestic non-government institutions, the Government and the rest of the world, with the last item converted into domestic currency. Total investment is the sum of the values of fixed investment (gross fixed capital formation) and stock changes. In the basic model version, the flexible variable, *to_sav*, performs the task of clearing this balance. None of the other items in the savings-investment balance is free to vary to assure that the balance holds. Given that the balancing role is performed by the savings side, this closure represents a case of investment-driven savings.

(52) $FSAV_t EXR_t = \sum_{FCAP,A} PINVTOT_t INVP_{FCAP,A,t} + \sum_{C} PDEM_{C,t} qdst_{C,t} - \sum_{INSDNG} to\_sav_{INSDNG,t} \left(1 - Tax_{Dir_{INSDNG,t}}\right) YI_{INSDNG,t} + GSAV_t + WALRAS_t$

Where $WALRAS_t$is the savings-investment imbalance (should be zero)

(53) $\sum_{INSDNG} to\_sav_{INSDNG,t} \left(1 - Tax_{Dir_{INSDNG,t}}\right) YI_{INSDNG,t} + GSAV_t + WALRAS_t + FSAV_t EXR_t = \sum_{FCAP,A} PINVTOT_t INVP_{FCAP,A,t} + \sum_{C} PDEM_{C,t} qdst_{C,t}$

7. *The dynamic*

Factors accumulation are defined as:

For physical capital:

(54) $K(FCAP, A, t) = (1 - 0.04)\, K(FCAP, A, t-1) + INV(FCAP, A, t)$

Where $K(FCAP, A, t)$ stands for demand of capital F from sector A.

For labour:

The labour supply by labour category (skilled (SKL) and unskilled (UNS) is given by

(55) $LS(SKL, t) = LS.l(SKL, t-1)\,(1 + g\_L(t))$

(56) $LS(UNS, t) = LS(UNS, t-1)\,(1 + g\_L(t))$

Concerning the debt evolution:

External and internal debt are given by

(57) $DebtF(t) = (1 - am(t))DebtF(t-1) + FSAVG(t)EXR(t)$

(58) $DebtD(t) = (1 - ad(t))DebtD(t-1) + DSAVG(t)$

Here $DebtF(t)$ is the foreign debt stock; $am(t)$ is the amortization of foreign debt, and $FSAVG(t)$ is the foreign public borrowing. $DebtD(t)$ is the domestic debt stock; ad is the amortization of domestic debt, and $DSAVG(t)$ is the domestic public borrowing.

B. SDGs MODULE

The value of each SDG target (ValSDG(SDG, t)) depends on other SDGs values and on other economic and social variables VEX, that are calculated by the core model. For the sake of illustration, we suppose linear relationships between all these variables. At a later stage, an in depth econometric exercise will be conducted at the country or global level to obtain a robust assessment of these relationships:

$$ValSDG(SDG,t) = \sum_{SDG'} ValSDG(SDG',t)\sigma_{SDGS(SDG,SDG')} + \sum_{VEX} ValVEX(VEX,t)\sigma_{SDGS(SDG,VEX')}$$

Where $ValVEX(VEX,t)$ are economic and social variables calculated by the core model and defined as follow:

$$ValVEX('VEX1',t) = \frac{\sum_{A\in AAGR(A)} VA(A,t)}{\sum_{A\in AAGR(A)} L\_UNS(A,t) + L\_SKL(A,t)}$$

$$ValVEX('VEX2',t) = \frac{YA('Tourism',t)}{GDP(t)}$$

$$VALVEX('VEX3',t) = \overline{VALVEX('VEX3',t)}$$

$$ValVEX('VEX4',t) = \frac{\sum_{A\in AIND(A)} VA(A,t)}{GDP(t)}$$

$$ValVEX('VEX5',t) = \frac{\sum_{A\in AIND(A)} L\_UNS(A,t) + L\_SKL(A,t)}{\sum_{A} L\_UNS(A,t) + L\_SKL(A,t)}$$

$$ValVEX('VEX6',t) = \frac{\sum_{A\in Hightech(A)} VA(A,t)}{GDP(t)}$$

$$ValVEX('VEX7',t) = \frac{YA('a\_FISH',t)}{GDP(t)}$$

$$ValVEX('VEX8',t) = \sum_{(R,C)\in CAGR(C)} \max(0, pwe(C,R,t)te(C,R,t)EXR(t)EXP(C,R,t))$$

$$ValVEX('VEX9',t) = WSKL('LOC',t)$$

$$ValVEX('VEX10',t) = UNEMP('LOC',t)$$

$$ValVEX('VEX11',t) = Grant(t)shoda('AFT')$$

$$ValVEX('VEX12',t) = trnsfr('Gov',' H40',t)$$

$$ValVEX('VEX13',t) = \frac{\sum_{A} TOSS(UNS,t)WUNS(UNS,t)L\_UNS(A,t) + TOSS(SKL,t)WSKL(SKL,t)L\_SKL(A,t)}{GDP(t)}$$

$$ValVEX('VEX14',t) = shG('Cuture',' Publ,t)G('c\_Publ',t) + shINV(('Cuture',' Publ,t)INVPUB('cap',' a\_Publ,t))$$

$$ValVEX('VEX15',t) = shG('R\&D\_Marin',' Publ,t)G('c\_Publ',t) + shINV(('R\&D\_Marin',' Publ,t)INVPUB('cap','a\_PUbl',t)$$

$$ValVEX('VEX16',t) = \frac{INVPUB\_tot(t)}{GDP(t)}$$

$$ValVEX('VEX17',t) = \frac{EXPG(t)}{GDP(t)}$$

$$ValVEX('VEX18',t) = shG('Cuture',' Publ,t)G('c\_Publ',t) + shINV(('Cuture',' Publ,t)INVPUB('cap',' a\_Publ',t))$$

$$ValVEX('VEX19',t) = G('c\_Publ',t) + INVPUB('cap',' a\_Publ',t)$$

$$ValVEX('VEX20',t) = \sum_{a\in CAGR(C)} G(c,t) + \sum_{A\in AAGR(A)} INVPUB('cap',A,t)$$

$$ValVEX('VEX21',t) = shG('Basic',' Publ,t) + shINV('Basic',' Publ,t)$$

$$ValVEX('VEX22',t) = shG('social',' Publ,t) + shINV('social',' Publ,t)$$

$$ValVEX('VEX23',t) = G('c\_Educ',t) + INVPUB('cap','a\_Educ',t)$$

$$ValVEX('VEX24',t) = \sum_{C\in ICT(C)} D(C,t)$$

$$ValVEX('VEX25',t) = G('c\_Energy',t) + INVPUB('cap','a\_Energy',t)$$

$$ValVEX('VEX26',t) = shG('Env,' 'Publ,t) + shINV('Env',' Publ,t)$$

$$ValVEX('VEX27',t) = \frac{\sum_A Nitrogen(A)VA(A,t)}{GDP(t)}$$

$$ValVEX('VEX28',t) = shG('R\&D',' Publ,t)G('c\_Publ',t) + shINV('R\&D',' Publ,t)INVPUB('cap','a\_Publ',t)$$

$$ValVEX('VEX29',t) = G('c\_Heal',t) + INVPUB('cap','a\_Heal',t)$$

$$ValVEX('VEX30',t) = \frac{\sum_{A\in AAGR(A)} VA(A,t)}{GDP(t)}$$

$$ValVEX('VEX31',t) = shG('sanitation',' Publ,t) + shINV('sanitation',' Publ,t)$$

$$ValVEX('VEX32',t) = shG('road',' trnsfrport,t) + shINV('road',' trnsfrport,t)$$

$$ValVEX('VEX33',t) = shG('security',' Publ,t) + shINV('security',' Publ,t)$$

$$ValVEX('VEX34',t) = shG('justice','Publ,t) + shINV('justice',' Publ,t)$$

$$ValVEX('VEX35',t) = shG('stat,' Publ,t) + shINV('stat',' Publ,t)$$

$$ValVEX('VEX36',t) = G('c\_trans',t) + INVPUB('cap','a\_trans',t)$$

$$ValVEX('VEX37',t) = \frac{YA('a\_trans',t)}{GDP(t)}$$

$$ValVEX('VEX38',t) = shG('waste',' Publ,t) + shINV('waste',' Publ,t)$$

$$ValVEX('VEX39',t) = G('c\_water',t) + INVPUB('cap','a\_water',t)$$

$$ValVEX('VEX40',t) = D(\text{"c\_Water"},t)$$

$$ValVEX('VEX41',t) = D(\text{"banking"},t)$$

$$ValVEX('VEX42',t) = D(\text{"}ecommerce\text{"},t)$$

$$ValVEX('VEX43',t) = D(\text{internet},t)$$

$$ValVEX('VEX44',t) = D(\text{"mobile"},t)$$

$$ValVEX('VEX45',t) = GOVERN(t)$$

$$ValVEX('VEX46',t) = Gender(t)$$

$$ValVEX('VEX47',t) = GOVERN(t)$$

$$ValVEX('VEX48',t) = \frac{\sum_H EXPH(H,t)}{\sum_H EXPH(H,t-1)}$$

$$ValVEX('VEX49',t) = GDP(t)$$

$$ValVEX('VEX50',t) = \frac{\sum_{(FLND,A)} K(FLND,A,t)}{LANDS(t)}$$

$$ValVEX('VEX51',t) = Grant(t)shoda('education')$$

$$ValVEX('VEX52',t) = Grant(t)shoda('water')$$

$$ValVEX('VEX53',t) = 1$$

$$ValVEX('VEX54',t) = \frac{IntF(t) + AMRF(t)}{\sum_{R,C} PEXP(C,R,t)EXP(C,R,t)}$$

$$ValVEX('VEX55') = \frac{\sum_A CO2(A)VA(A,t)}{GDP(t)}$$

$$ValVEX('VEX56',t) = \frac{\frac{GDP(t)-GDP(t-1)}{GDP(t)}}{\frac{\sum_A FLAB(F)\sum_A L(SKL,A,t) - L(SKL,A,t-1)}{\sum_{A,FLAB(F)} L(SKL,A,t-1)}}$$

$$ValVEX('VEX57',t) = \frac{\sum_A GHG\_TFC(A)VA(AT)}{GDP(t)}$$

$$ValVEX('VEX58',t) = \frac{\sum_{A\in AIND(A)} IC('C\_Energy',A,t)}{\sum_{A\in AIND(A)} VA(A,t)}$$

$$ValVEX('VEX59',t) = ica(C,A)$$

$$ValVEX('VEX60',t) = FDI(t)$$

$$ValVEX('VEX61',t) = \frac{GDP(t)}{POP(t)}$$

$$ValVEX('VEX62',t) = \frac{\sum_{A\in AIND(A)} VA(A,t)}{GDP(t)}$$

$$ValVEX('VEX63',t) = \overline{ValVEX('VEX63',t)}$$

$$ValVEX('VEX64',t) = \frac{\sum_{(FLND,A)} K(FLND,A,t)}{GDP(t)}$$

$$ValVEX('VEX65',t) = WorldTariff(t)$$

$$ValVEX('VEX66',t) = Grant(t)$$

$$ValVEX('VEX67',t) = \overline{ValVEX('VEX67',t)}$$

$$ValVEX('VEX68',t) = shG('EN\_Eff','Publ,t)G('c\_Publ',t) + shINV('EN\_Eff','Publ,t)INVPUB('cap','a\_Publ',t)$$

$$ValVEX('VEX69',t) = \overline{ValVEX('VEX69',t)}$$

$$ValVEX('VEX70',t) = REMCOST(t)$$

$$ValVEX('VEX71',t) = \overline{ValVEX('VEX71',t)}$$

$$ValVEX('VEX72',t) = Zero\ Tariff(t)$$

$$ValVEX('VEX73',t) = \frac{sub('a\_Energy',t)YA('a\_Energy',t)}{GDP(t)}$$

$$ValVEX('VEX74',t) = sub('Fish',t)YA('Fish',t)$$

$$ValVEX('VEX75',t) = \frac{\sum_A WUNS(UNS,t)L\_UNS(A,t) + WSKL(SKL,t)L\_SKL(A,t)}{GDP(t)}$$

$$ValVEX('VEX76',t) = 1$$

$$ValVEX('VEX77',t) = TARIFFLDC(T)$$

$$ValVEX('VEX78',t) = TariffAGR(T)$$

$$ValVEX('VEX79',t) = TariffENV(t)$$

$$ValVEX('VEX80',t) = \frac{\sum_{INSDNG} Tax\_Dir(INSDNG,t)YI(INSDNG,t)}{YG(t)}$$

IV. MODEL INTERFACE

The SDG interface provides options for policy simulations and presents their impacts on economic sectors (in graph and excel). The interface is designed to give only relevant information for analysis of the policy impacts in a clear, simple and easy to follow way, allowing non-technical economists to use the model. The complexity of doing policy simulations is thus eliminated, allowing anyone with basic computer skills to access and use the application.

A. TECHNICAL ASPECTS

1. *System technical requirements and installation*

(a) *Prerequisites*

The system was developed using Visual Studio 2010 tool (and can be edited using any version of Visual Studio from 2010 onwards) and ASP.NET C#. The output of the system is an executable file that will run on every PC/laptop. It is compatible with Windows Vista, Windows 7, Windows 10, etc.… Nothing needs to be installed to run this application - it is an executable file that runs by itself. However, in case the exe does not start properly, the user should download and install Microsoft .Net Framework 4.0 from the following official link: https://www.microsoft.com/en-us/download/details.aspx?id=17851.

(b) *Application limitations*

This application has no data limitations. It can handle any size of data as the simulations' outputs are saved in one place and replaced every time the simulation is run. Moreover, there is no database involved in this application, only excel files that have no limitations. Regarding the SDGs and sectoral and macroeconomic results, a copy of them is saved inside a 'Results' folder, which can be cleaned as necessary or kept for later access. This is a user's decision but does not add any data limitations.

(c) *Minimum hardware requirements to run the application*

To run this application, there is no specific hardware requirements in terms of central processing unit (CPU), hard disk, and memory RAM; however, the higher the specifications, the quicker the processing of the simulation will be.

Regarding video graphics array (VGA) and screen resolution, this application accommodates the smallest possible resolution (800x600) projected using a regular projector. In addition to the smallest version of this application, another version is also submitted that works perfectly on a 13 inch laptop (full screen) with a resolution of 1024x768.

(d) *Application troubleshooting*

In case the application does not open or start properly when you double click on the exe file, please consider one of the following possible reasons:

- Missing .Net Framework 4.0, please make sure to install it.
- Missing one of the following files or folders that need to be available in the same folder where the application is running: Gams_Path_File.txt, Working_Directory_Path_File.txt, SDGUserManual. chm (the help file), and the Chocs and Charts folders.
- If the application stops working and suddenly freezes while running a certain simulation, this might be due to a memory issue on the PC, or many other processes running in parallel, so try to close the application by force, free some space and rerun it.
- Make sure to set the correct paths for the application to run properly, both the gams path and the CGE working directory path.

(e) *Application folder structure*

The application will be placed inside a folder (let us assume the folder's name is SDG). This same folder should contain the .exe file (SDG1280Final.exe for example). It should also contain two .txt files that are the default working and gams application paths: Gams_Path_File.txt and Working_Directory_Path_File.txt. Note that the application will not work if any or both files are not in the application path. Moreover, there will be a CGE folder that contains the CGE model used to run the simulations and another Shocks folder used to save the text files of the shocks when saving them from the application and later on loading them when needed. One important thing to note is that the CGE folder should contain several excel templates used to display the outputs of the simulation in a nice layout, in addition to a Results folder where the results will be saved. Administrators and users need to make sure that the CGE folder has the following required files: ResultsTemplate.xlsx, SectoralTemplate.xlsx, GoalsTemplate.xlsx, and GoalTemplate.xlsx in addition to the Results folder.

Assuming the user places the application folder- named "SDG"- under the "D" drive on his/her PC. The user needs to edit both paths' text files (Gams_Path_File.txt and Working_Directory_Path_File.txt) and set their contents accordingly. In this case, the content of Working_Directory_Path_File.txt file will be one line that is the path of the CGE folder as follows: D:\SDG\CGE. The content of Gams_Path_File.txt will also be one line that is the path of the gams.exe application as follows: D:\SDG\gams\gams.exe in case the gams IDE folder is also placed inside the SDG application folder. When the user runs the SDG Simulator application, he/she can also edit the working path and gams path from the menu as explained in the user manual section IV-B.

2. *Programming language*

The interface is a Windows-based .net application developed from scratch using the Microsoft .NET Framework. The application is developed using the C# .NET programming language. The framework (Microsoft .NET Framework 4.6.1) is provided by the consultant. No Database is required for this application.

The SDG Simulator will run on top of a CGE model developed by ESCWA. The SDG Simulator will generate a sim.gms file,[2] which is the simulation file created from all the shocks and parameters added to the

[2] The GAMS IDE is a general text editor with the ability to launch and monitor the compilation/execution of GAMS models. Progress of a compilation/execution can be monitored in the process window. The process window is also used as a navigation tool to locate syntax errors in the source code and to find various anchor points in the listing file. The IDE also facilitates the selection of

simulation instance. This simulation file will then be executed using the gams.exe[3] application to generate all the results and output files.

The application is very user-friendly with attractive and highly representative graphical representations useful for both researchers and senior officials. Users of the new interface will find it extremely easy to operate the system, interact with it, design simulations and generate results.

3. *Design basis and coding logic*

Nothing is static in this application, even the main background image used is a vector repetitive image to allow collapse and expand of the form without stretching the image. The coding logic adopted while developing this application was mainly code reusability and function calling. Every control in the form has its own code, and similar controls (for example 17 SDGs) are calling the same functions but with different parameters.

4. *Architecture*

Having no database in this Windows application, a one-tier architecture was used where all the forms and code behind are in one layer.

5. *Source code*

The source code will be submitted as part of the project deliverables as a Microsoft Visual Studio Solution that can be edited with any Microsoft Visual Studio 2010 software or newer. The source code is well documented for any developer to understand modify if need be. The documentation is also submitted with the source as an xml file, showing a description of all used functions, their inputs/outputs and behaviour.

B. USER MANUAL

The prototype SDG interface developed by ESCWA promotes user engagement and creates a more interactive feel throughout. The interface includes functionalities and specifications for performing manipulations and simulations on SDGs. The design in figure 3 is the front page of the SDG interface prototype.

default solvers and manages GAMS parameters on a file-by-file basis. A ". gms" file is a file that represents a GAMS model written in the GAMS language and will be compiled and executed using the GAMS System.

[3] The General Algebraic Modelling System (GAMS) is a high-level modelling system for mathematical programming and optimization. It consists of a language compiler and a stable of integrated high-performance solvers. GAMS is tailored for complex, large-scale modelling applications and allows you to build large maintainable models that can be adapted quickly to new situations.

Figure 3. Final SDG Simulator design

The SDG Simulator is split into the following six main sections: top menu, grid and results' buttons, parameters, grid/list of shocks,[4] SDG indicators, and graphs.

Top menu section

In this section, there is the menu of the SDG Simulator that contains the following four menu items:

- Working Path: a menu item that has two sub-menu items (*Show Current Path* and *Change Path*) as shown in figure 4: the former is used to show the current working path where the CGE folder exists, and the latter is used to set the working path by selecting the corresponding CGE folder.
- Gams Path: a menu item with two sub-menu items (*Show Current Path* and *Change Path*): the former is used to show the current gams application (gams.exe) path where the gams application is installed and where its executable file resides, and the latter is used to set the gams path by selecting the corresponding gams.exe executable file which will be used to run the simulations.
- About: this menu item is used to show a small description about the SDG Simulator application.

[4] An economic shock is an event that produces a significant change within an economy, despite occurring outside of it. Economic shocks are unpredictable and typically impact supply or demand throughout markets.

Figure 4. SDG Simulator menu

Shock grid buttons and result buttons section

In this section, the CGE Simulator has nine buttons: the first five buttons are used to edit the shock grid and the other four buttons are used to show the results of the simulations:

Grid Buttons: Five buttons resemble the action items used in editing the shock grid, as shown in figure 5:

- *Add Shock*: this button is used to add a new shock to the grid based on the selected parameters (figure 7).
- *Clear*: this button is used to clear all the shocks added to the grid in one shot.
- *Save*: this button is used to save the added shocks to a text file (.txt) after specifying the name of the file.
- *Load*: this button is used to load shocks from a saved .txt file (which is the output of the Save button) into the grid.
- Run: this button is used to Run the simulation with all the added shocks and parameters (figure 7).

Figure 5. Grid action buttons

Results buttons: buttons are used to show the simulation's results as per figure 6:

- *Macro-Economic*: this button is used to show the macroeconomic results of the simulation. When clicking on this button, an excel file will open showing all the needed macroeconomic results.
- *SDGs*: this button is used as an indicator and to show the total Goals of the simulation. Upon clicking this button, the Goals.csv file will open showing all the 17 SDG values. This button will turn grey when the general GOALS 

indicator is negative and white when it is positive.
- *Sectoral*: this button is used to show the sectoral results of the simulation. When clicking on this button, a sectoral.csv file opens in excel showing all the needed sectoral results of the simulation.
- *Open Log*: this button is used to open the log file of the simulation. This log file is needed to get all the details of the simulation, especially whenever an execution error occurs; this file is used to identify and fix the error.

Figure 6. Results action buttons

Parameters to shock section

This section is used to specify the parameters that the user wants to add to the simulation before running it, as shown in figure 7. There are seven parameters that can be selected, and some of them are linked to one another.

- Policy: this is the main parameter. It is a dropdown list with the following possible 10 options: Factors Productivity, Government Current Expenditure, Public Investment, Indirect Taxation, Applied Tariffs, Direct Taxation, Native Labour Force, Foreign Labour Force, Exchange Rate, and World Price.
- From/To Year: this is the second parameter where the user can specify the From Year and To Year values. The possible year range is 2010 to 2030.
- Percentage: this is the percentage that will be added to the shock formula per selected policy. Let us assume the policy added is "Government Current Expenditure" with a percentage of **5 per cent** and an offset of **0.01**, the generated formula will contain the added percentage (1+0.05 = 1.05) multiplied by the policy (G) function of the selected argument (note that each argument has a text and a hidden value that is used when generating the equation, in this case it is clothing leather products footwear = 'c_tcclf') and time t, and to which we add the offset (0.01): 1.05*G_ref('c_tcclf', t)+(0.01).
- Offset: this is the offset that will be added to the shock formula, elaborated with the percentage parameter. Note that the offset should be in the 0.0x figure.
- Argument 1: this parameter is linked to the selected Policy and varies in value according to the selected Policy and can have one of the following 21 options: Agriculture, Crude Oil & Natural Gas Mining Quarrying, Food Processing Industries, Clothing Leather, Products Footwear, Wood, Paper and Publishing, Pharmaceuticals Products, Chemicals Products, Rubber and Plastics, Metallic Industries, Electrical and Engineering Industries, Other Industries, Electricity, Water, Construction, Transport, Education, Health, Public Administration, and Other Services.
- Argument 2: this argument is also linked to the selected Policy and is shown/hidden according to the selected Policy and will have a predefined value when it is shown for selection. Some possible values are: Rest of the World, and CAPITAL.

Figure 7. Parameters to shock

Shock grid section

This is main section of the SDG Simulator. The grid shows the added shocks along with their parameters. This grid has eight columns as shown in figure 8. The user can delete any row in the grid by clicking on the *delete bin* image in the corresponding *Del* column or by just selecting the row and pressing the *Delete* button on the keyboard. The user can also right click on the row and select *Delete Row*.

The user can increase the width of the columns with the mouse by holding the right corner of the column and moving the mouse right-left to increase/decrease the width. The user can also edit the *From Date*, *To Date*, *Percentage* and *Offset* values from within the grid directly: Double click on the cell to enter in *Edit* mode then press *Enter* when done editing.

Figure 8. Shock's Grid

SDGs and goal indicators section

In this section, the CGE Simulator shows the 17 Sustainable Development Goals, their respective indicators (at the bottom of each Goal) in addition to the general GOALS indicator that is calculated based on all the other 17 SDGs, as shown in figure 9.

Figure 9. Sustainable Development Goals

Each SDG is represented by its corresponding icon, along with the value returned by the simulation. The value is written underneath the SDG icon in red when it is negative and green when positive. The same applies to the general SDG GOALS icon.

- The icons are interactive; the user can click on each SDG icon to draw its corresponding column chart placed underneath the SDGs section.
- For more details regarding any of the SDGs, the user can simply double click on the required SDG icon and the corresponding Goal.csv file will open; the user can check and validate the numbers and results.
- The same applies to the general SDG GOALS indicator. When the simulation is successfully completed, the general SDG Goals bar chart is displayed by default, as per figure 10.

Graphical representation section

In this section, the CGE Simulator displays the results in a column chart covering all the 17 SDGs, in addition to the general GOALS Indicator.

As mentioned earlier, when the simulation is successfully completed, the general SDG Goal is displayed in the chart area, as shown in figure 10. Every column represents a Goal and every Goal has the same colour as its corresponding SDG indicator icon. The column chart of the general Goals indicator extracts the readings (indicators) from the Goal name and its corresponding performance to create the displayed chart.

Figure 10. Goals column chart

Regarding the other 17 SDGs, the column chart draws the indicator name and its corresponding performance. Figure 11 is a sample of a chart drawing the result of Goal 9.

Figure 11. Goal 9 bar chart

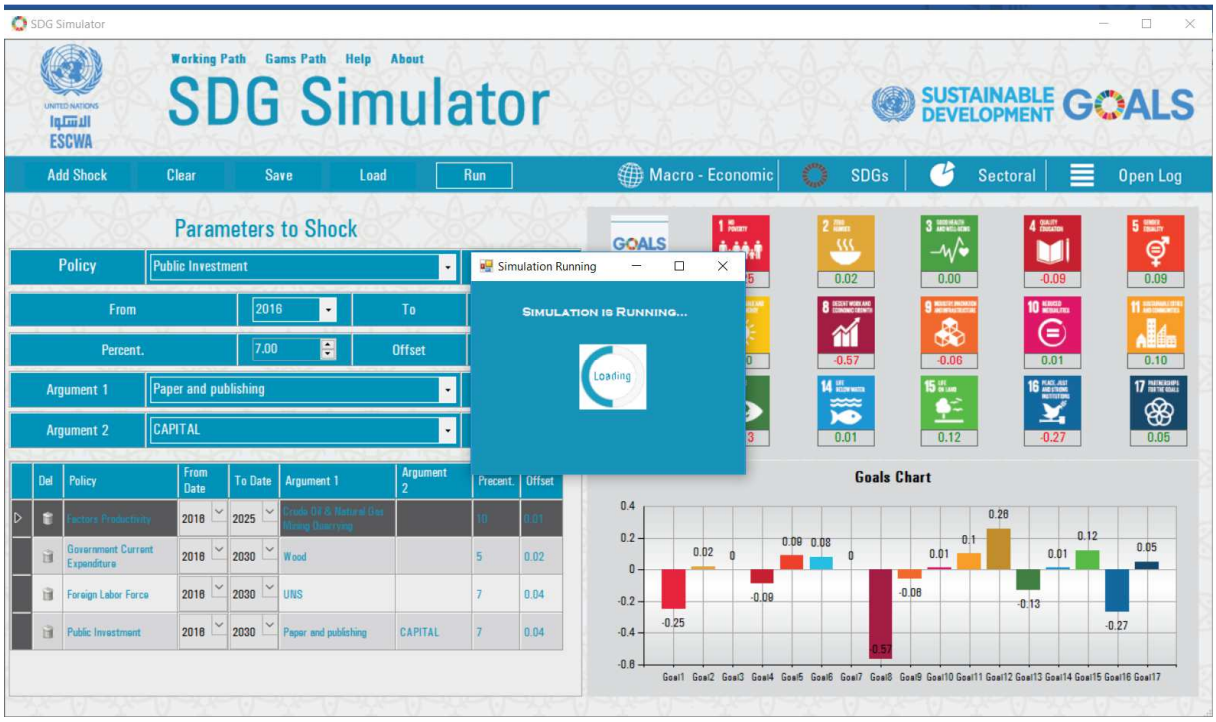
Simulation workflow sample

The user has to run the SDG Simulator application by double clicking on the executable file (let us call it SDG1280Final.exe or SDG600Demo.exe). When running the application, the interface opens readily for the user to enter the parameter, and specify the simulation parameters and input. The user can run the simulation and wait for it to converge, then check the outputs of the simulation. Figure 12 is a step-by-step example of a simulation in which three policies were added with different arguments, year spans, percentages and offsets.

Figure 12. Application process flow chart

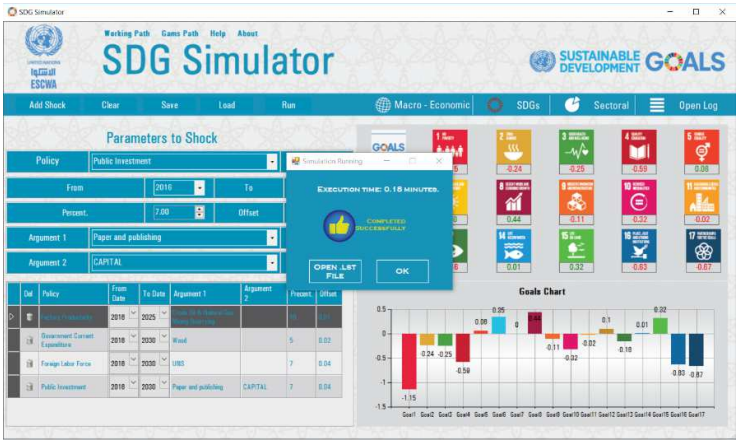
The following policies have been selected and added to the shock grid: *Factors Productivity*, *Government Current Expenditure*, *Foreign Labour Force*, and *Public Investment*. With every policy, different arguments have been selected as shown in figure 13 When the ***Run*** button is clicked to run the application, a dialog box opens showing an animated image to tell the user that the simulation is running in the background.

Figure 13. Running simulation



When the simulation is completed, the dialogue box alerts the user that the simulation was successfully completed and the user can access the ".lst" file, which is the log file generated by gams in case he/she wants to go into the details of the simulation step-by-step. When the user clicks on ***OK*** in the dialogue box to check the results of the simulation, he/she will see by default the Column Chart of the general Goals indicator displayed in the chart area, in addition to the value of each SDG indicator written below its corresponding icon in red when negative and green when positive (figure 14).

Figure 14. Successfully completed simulation



As shown in figures 14 and 15 for the selected example, the simulation is successfully completed and the general SDG GOALS indicator is negative (-6 per cent); this is also reflected in the grey colour of the SDGs results button.

By way of running further sensitivity analyses, a variation of this sample run can be made by changing the *Percentage* and *Offset* values of the *Public Investment Policy* to 3 and 0.01 instead of 7 and 0.04, respectively. With this variation, the simulation converges to a positive cumulative GOALS indicator (+2 per cent) and the *SDG* results button turns white, as shown in figure 16.

In one simulation, **Goal 4** (Quality Education) had a value of **-0.25;** please refer to figure 17. To draw the graph of Goal 4, the user can click on its corresponding SDG icon; upon clicking on the Quality Education SDG icon, the graph is drawn as shown in figure 17. Additionally, to get more details about any of the Goals, the user can double-click on its corresponding SDG Indicator icon, and an excel file opens showing the detailed results and numbers (figure 18).

Figure 15. Completed simulation outcome

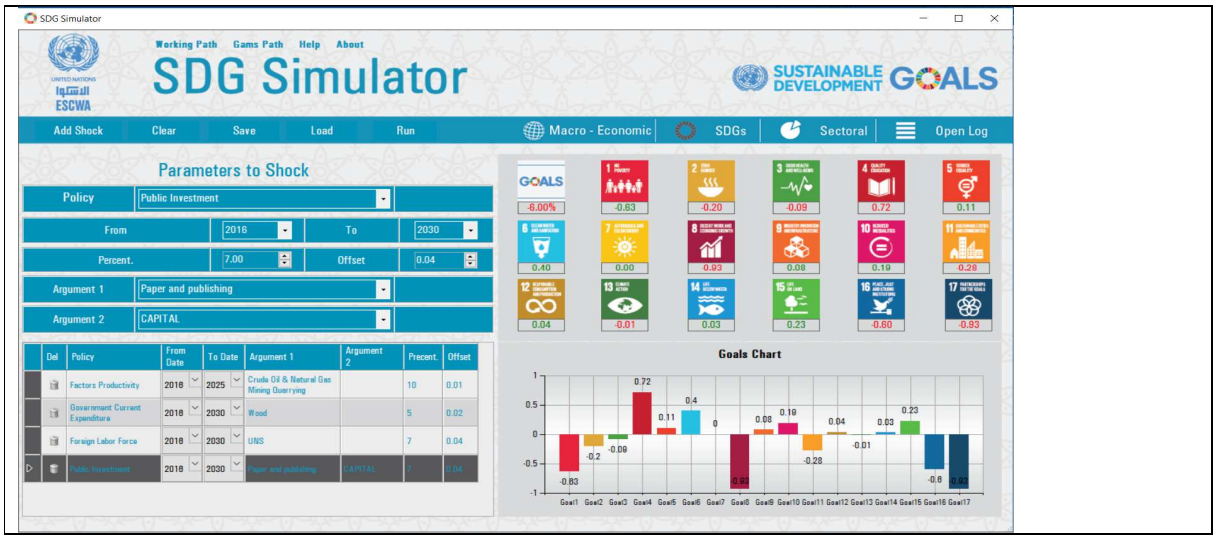


Figure 16. Another completed simulation (1)

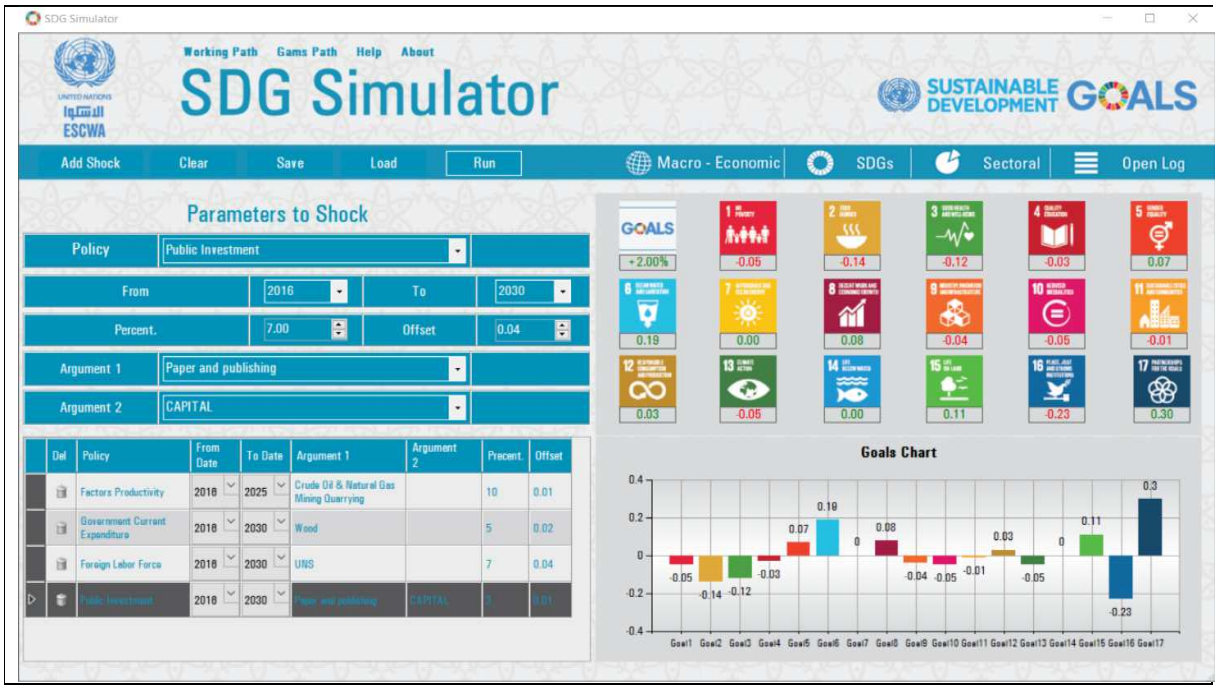


Figure 17. Another completed simulation (2)

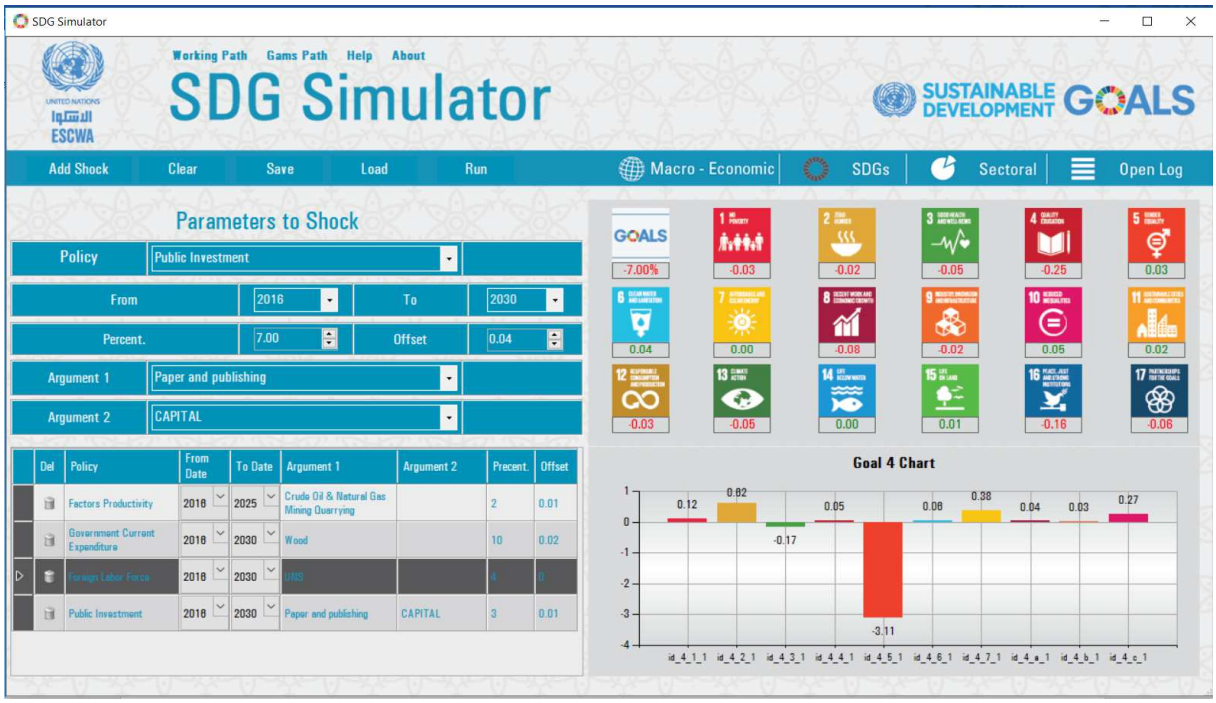


Figure 18. Goal 4 detailed csv file

	A	B	C	D	E	F
1						
2						
3			ESCWA			
4						
5						
6	Goal4	-0.25				
7	Target	Weight of the target in the goal	Performance of the target	Indicator	Weight of the indicator in the target	Performance of the indicator
8	Target_4_1	0.14	0.12	id_4_1_1	1	0.12
9	Target_4_2	0.1	0.62	id_4_2_1	1	0.62
10	Target_4_3	0.03	-0.17	id_4_3_1	1	-0.17
11	Target_4_4	0.12	0.05	id_4_4_1	1	0.05
12	Target_4_5	0.12	-3.11	id_4_5_1	1	-3.11
13	Target_4_6	0.13	0.06	id_4_6_1	1	0.06
14	Target_4_7	0.02	0.38	id_4_7_1	1	0.38
15	Target_4_a	0.08	0.04	id_4_a_1	1	0.04
16	Target_4_b	0.12	0.03	id_4_b_1	1	0.03
17	Target_4_c	0.14	0.27	id_4_c_1	1	0.27
18						
19						
20						
21						
22						

Results

V. CONCLUSION AND WAY FORWARD

ESCWA can help establish this framework by developing the model (including the theoretical framework, the social accounting matrix (SAM), the SDGs correlation index and the interface), defining the weighting system that will allow policymakers to calculate the optimal scenario thus make accurate decisions, and putting in place an monitoring and evaluation system.

Annex I

List of internal exogenous SDGs indicators

Goal	Target	Indicator	Indicator
Goal 1 End poverty in all its forms everywhere	Target 1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance.	id.1.4.2	Share of women among agricultural land owners by age and location (U/R)
Goal 1 End poverty in all its forms everywhere	Target 1.b Create sound policy frameworks at the national, regional and international levels, based on pro-poor and gender sensitive development strategies, to support accelerated investment in poverty eradication actions.	id.1.b.1	Number of national action plans related to multi-lateral environmental agreements that support accelerated investment in actions that eradicate poverty and sustainably use natural resources.
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.	id.3.d.1	Percentage of attributes of 13 core capacities that have been attained at a specific point in time.
Goal 5 Achieve gender equality and empower all women and girls	Target 5.1 End all forms of discrimination against all women and girls everywhere.	id.5.1.1	Whether or not legal frameworks are in place to promote equality and non-discrimination on the basis of sex
Goal 5 Achieve gender equality and empower all women and girls	Target 5.4 Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate.	id.5.4.1	Average daily (24 hours) spent on unpaid domestic and care work, by sex, age and location (for individuals five years and above)
Goal 5 Achieve gender equality and empower all women and girls	Target 5.a Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws.	id.5.a.1	Share of women among agricultural land owners by age and location (U/R)
Goal 5 Achieve gender equality and empower all women and girls	Target 5.a Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws.	id.5.a.2	The legal framework includes special measures to guarantee women's equal rights to land ownership and control.
Goal 10 Reduce inequality within and among countries	Target 10.5 Improve the regulation and monitoring of global financial markets and institutions and strengthen the implementation of such regulations	id.10.5.1	Adoption of a financial transaction tax (Tobin tax) at a world level
Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable	Target 11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities	id.11.7.1	The average share of the built-up areas of cities in open space in public ownership and use.
Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable	Target 11.a Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning	id.11.a.1	Cities with more than 100,000 inhabitants that implement urban and regional development plans integrating population projections and resource needs

Annex I (*continued*)

Goal	Target	Indicator	Indicator
Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable	Target 11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels	id.11.b.1	Percentage of cities implementing risk reduction and resilience policies that include vulnerable and marginalized groups.
Goal 12 Ensure sustainable consumption and production patterns	Target 12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle	id.12.6.1	Number of companies publishing sustainability reporting
Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Target 14.b Provide access for small-scale artisanal fishers to marine resources and markets	id.14.b.1	Percentage of catches that are subject to a catch documentation scheme or similar traceability system as a percentage of the total catches that are less than x tons and traded in major markets.
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.7 Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products	id.15.7.2	Proportion of detected trade in wildlife and wildlife products that is illegal
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species	id.15.8.1	Adoption of national legislation relevant to the prevention or control of invasive alien species
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts	id.15.9.1	Number of national development plans and processes integrating biodiversity and ecosystem services values
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.c Enhance global support for efforts to combat poaching and trafficking of protected species, including by increasing the capacity of local communities to pursue sustainable livelihood opportunities	id.15.c.1	Proportion of detected trade in wildlife and wildlife products that is illegal

Annex I (*continued*)

Goal	Target	Indicator	Indicator
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.6 Develop effective, accountable and transparent institutions at all levels	id.16.6.2	Percentage of recommendations to strengthen national anti-corruption frameworks (institutional and legislative) implemented, as identified through the UNCAC Implementation Review Mechanism.
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels	id.16.7.1	Proportions of positions (by age, sex, disability and population groups) in public institutions (national and local legislatures, public service, and judiciary) compared to national distributions.
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.5 Adopt and implement investment promotion regimes for least developed countries	id.17.5.1	Number of national & investment policy reforms adopted that incorporate sustainable development objectives or safeguards x country
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.15 Respect each country's policy space and leadership to establish and implement policies for poverty eradication and sustainable development	id.17.15.1	Numbers of constraints that are embodied in ODA or loan agreements, IIAs. RTAs etc.
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.16 Enhance the global partnership for sustainable development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the sustainable development goals in all countries, in particular developing countries	id.17.16.1	Indicator 7 from Global Partnership Monitoring Exercise: Mutual accountability among development co-operation actors is strengthened through inclusive reviews

Annex II

List of external exogenous SDGs indicators

Goal	Target	Indicator	Indicator
Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Target 2.b Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round.	id.2.b.1	Percent change in Import and Export tariffs on agricultural products
Goa 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Target 4.b By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries.	id.4.b.1	Volume of ODA flows for scholarships by sector and type of study; Total net official development assistance (ODA) for scholarships and student costs in donor countries (types of aid E01 and E02). Data expressed in US dollars at the average annual exchange rate.
Goal 5 Achieve gender equality and empower all women and girls	Target 5.6 Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences.	id.5.6.2	[Proportion (%) of countries with laws and regulations that guarantee all women and adolescents access to sexual and reproductive health services, information and education (official records)
Goal 5 Achieve gender equality and empower all women and girls	Target 5.c Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels.	id.5.c.1	Percentage of countries with systems to track and make public allocations for gender equality and women's empowerment
Goal 6 Ensure availability and sustainable management of water and sanitation for all	Target 6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies	id.6.a.1	ODA for water and sanitation related activities and programmes
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Target 8.a Increase Aid for Trade support for developing countries, in particular least developed countries, including through the Enhanced Integrated Framework for Trade-Related Technical Assistance to Least Developed Countries	id.8.a.1	Aid for Trade Commitments and Disbursements (CBB)
Goal 10 Reduce inequality within and among countries	Target 10.6 Ensure enhanced representation and voice for developing countries in decision-making in global international economic and financial institutions in order to deliver more effective, credible, accountable and legitimate institutions	id.10.6.1	Percentage of members or voting rights of developing countries in international organizations.
Goal 10 Reduce inequality within and among countries	Target 10.7 Facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies	id.10.7.1	Recruitment cost born by employee as percentage of yearly income earned in country of destination.
Goal 10 Reduce inequality within and among countries	Target 10.7 Facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies	id.10.7.2	International Migration Policy Index

Annex II (*continued*)

Goal	Target	Indicator	Indicator
Goal 10 Reduce inequality within and among countries	Target 10.a Implement the principle of special and differential treatment for developing countries, in particular least developed countries, in accordance with World Trade Organization agreements	id.10.a.1	Share of tariff lines applied to imports from LDCs/developing countries with zero-tariff
Goal 10 Reduce inequality within and among countries	Target 10.b Encourage official development assistance and financial flows, including foreign direct investment, to States where the need is greatest, in particular least developed countries, African countries, small island developing States and landlocked developing countries, in accordance with their national plans and programmes	id.10.b.1	OECD ODA data, disaggregated by recipient and donor countries
Goal 10 Reduce inequality within and among countries	Target 10.c By 2030, reduce to less than 3 per cent the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than 5 per cent	id.10.c.1	Remittance costs as a percentage of the amount remitted
Goal 12 Ensure sustainable consumption and production patterns	Target 12.1 Implement the 10-year framework of programmes on sustainable consumption and production, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries	id.12.1.1	Number of countries with SCP National Actions Plans or SCP mainstreamed as a priority or target into national policies, poverty reduction strategies and sustainable development strategies
Goal 12 Ensure sustainable consumption and production patterns	Target 12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment	id.12.4.1	Number of Parties to international multilateral environmental agreements on hazardous and other chemicals and waste that meet their commitments and obligations in transmitting information as required by each relevant agreement
Goal 12 Ensure sustainable consumption and production patterns	Target 12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities	id.12.7.1	Number of countries implementing Sustainable Public Procurement policies and action plans
Goal 12 Ensure sustainable consumption and production patterns	Target 12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	id.12.8.1	Number of countries reporting inclusion of sustainable development and lifestyles topics in formal education curricula
Goal 13 Take urgent action to combat climate change and its impacts (Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.)	Target 13.2 Integrate climate change measures into national policies, strategies and planning	id.13.2.1	Number of countries that have formally communicated the establishment of integrated low-carbon, climate-resilient, disaster risk reduction development strategies (e.g. a national adaptation plan process, national policies and measures to promote transition to environmentally-friendly substances and technologies).
Goal 13 Take urgent action to combat climate change and its impacts (Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.)	Target 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	id.13.3.1	Number of countries that have integrated mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula

Annex II (*continued*)

Goal	Target	Indicator	Indicator
Goal 13 Take urgent action to combat climate change and its impacts (Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.)	Target 13.a Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible	id.13.a.1	Mobilized amount of USD per year starting in 2020 accountable towards the USD 100 billion commitment
Goal 13 Take urgent action to combat climate change and its impacts (Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.)	Target 13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries, including focusing on women, youth and local and marginalized communities	id.13.b.1	Number of LDCs that are receiving specialized support for mechanisms for raising capacities for effective climate change related planning and management, including focusing on women, youth, local and marginalized communities
Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Target 14.c Enhance the conservation and sustainable use of oceans and their resources by implementing law as reflected in UNCLOS, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of The Future We Want.	id.14.c.1	Number of countries implementing either legally or programmatically the provisions set out in regional seas protocols and ratification and implementation of the ILO Maritime and Fisheries Conventions
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.6 Ensure fair and equitable sharing of the benefits arising from the utilization of genetic resources and promote appropriate access to such resources	id.15.6.1	Number of countries that have adopted legislative, administrative and policy frameworks for the implementation of the Nagoya Protocol
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.a Mobilize and significantly increase financial resources from all sources to conserve and sustainable use biodiversity and ecosystems	id.15.a.1	Official development assistance in support of the CBD
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.b Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation	id.15.b.1	Forestry official development assistance and forestry FDI

Annex II (*continued*)

Goal	Target	Indicator	Indicator
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.1 Significantly reduce all forms of violence and related death rates everywhere	id.16.1.2	Conflict-related deaths per 100,000 people (disaggregated by age, sex and cause)
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels	id.16.7.2	Proportion of countries that address young people's multisectoral needs with their national development plans and poverty reduction strategies
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.8 Broaden and strengthen the participation of developing countries in the institutions of global governance	id.16.8.1	Percentage of members or voting rights of developing countries in international organizations.
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.9 Enhance international support for implementing effective and targeted capacity-building in developing countries to support national plans to implement all the sustainable development goals, including through North-South, South-South and triangular cooperation	id.17.9.1	The dollar value of financial and technical assistance, including through North-South, South-South, and triangular cooperation, committed to developing countries' designing and implementing a holistic policy mix that aim at sustainable development in three dimensions (including elements such as reducing inequality within a country and governance).
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.10 Promote a universal, rules-based, open, non-discriminatory and equitable multilateral trading system under the World Trade Organization, including through the conclusion of negotiations under its Doha Development Agenda	id.17.10.1	Worldwide weighted tariff-average This indicator can be disaggregated and analysed by type of tariff (MFN applied rates and preferential rates), by product sector, by region and by level of development. The unit of measurement will be in % terms. Ad valorem equivalents (AVE) will be calculated for those tariffs that are not expressed in percentage. This methodology also allows for cross-country comparisons. Calculations can be performed on a yearly basis. These calculations are already part of the MDG Gap task force report.

Annex II (*continued*)

Goal	Target	Indicator	Indicator
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.11 Significantly increase the exports of developing countries, in particular with a view to doubling the least developed countries' share of global exports by 2020	id.17.11.1	Developing country's and LDCs' exports (by partner group and key sectors), including services.
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.12 Realize timely implementation of duty-free and quota-free market access on a lasting basis for all least developed countries, consistent with World Trade Organization decisions, including by ensuring that preferential rules of origin applicable to imports from least developed countries are transparent and simple, and contribute to facilitating market access	id.17.12.1	Average tariffs faced by developing countries and LDCs by key sectors
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.14 Enhance policy coherence for sustainable development	id.17.14.1	Number of countries that have ratified and implemented relevant international instruments including environmental, human rights, and labour instruments
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.19 By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries	id.17.19.1	Financial and other resources made available to strengthen the statistical capacity in developing countries

Annex III

List of endogenous SDGs indicators

Goal	Target	Indicator	Indicator
Goal 1 End poverty in all its forms everywhere	Target 1.1 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day.	id.1.1.1	Proportion of population below $1.25 (PPP) per day disaggregated by sex and age group and employment status (or Proportion of employed people living on less that $1.25 PPP) a day)
Goal 1 End poverty in all its forms everywhere	Target 1.2 By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions.	id.1.2.1	Proportion of population living below national poverty line, disaggregated by sex and age group
Goal 1 End poverty in all its forms everywhere	Target 1.3 Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable.	id.1.3.1	Percentage of population covered by social protection floors/systems, disaggregated by sex, composed of the following: a) Percentage of older persons receiving a pension; b) Percentage of households with children receiving child support; c) Percentage of working-age persons without jobs receiving support; d)Percentage of persons with disabilities receiving benefits; e) Percentage of women receiving maternity benefits at childbirth; f) Percentage of workers covered against occupational injury; and g) Percentage of poor and vulnerable people receiving benefits.
Goal 1 End poverty in all its forms everywhere	Target 1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance.	id.1.4.1	Proportion of the population living in households with access to basic services.
Goal 1 End poverty in all its forms everywhere	Target 1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.	id.1.5.1	Number of deaths, missing people, injured, relocated or evacuated due to disasters per 100,000 people.
Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Target 2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.	id.2.1.1	Prevalence of undernourishment
Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Target 2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round.	id.2.1.2	Prevalence of population with moderate or severe food insecurity, based on the Food Insecurity Experience Scale (FIES)
Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Target 2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons.	id.2.2.1	Prevalence of stunting (height for age <-2 SD from the median of the WHO Child Growth Standards) among children under five years of age
Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Target 2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.	id.2.4.1	Percentage of agricultural area under sustainable agricultural practices.

Annex III (*continued*)

Goal	Target	Indicator	Indicator
Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Target 2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional and international levels, and ensure access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed.	id.2.5.1	Ex Situ Crop Collections Enrichment index
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births.	id.3.1.1	Maternal deaths per 100,000 live births
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births.	id.3.1.2	Proportion of births attended by skilled health personnel
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births.	id.3.2.1	Under-five mortality rate (deaths per 1,000 live births)
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births.	id.3.2.2	Neonatal mortality rate (deaths per 1,000 live births)
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.	id.3.3.1	Number of new HIV infections per 1,000 susceptible population (by age, sex, and key populations)
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.	id.3.3.2	TB incidence per 1,000 persons per year
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.	id.3.3.3	Malaria incident cases per 1,000 person per year
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.	id.3.3.4	Estimated number of new hepatitis B infections per 100,000 population in a given year
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well being.	id.3.4.1	Probability of dying of cardiovascular disease, cancer, diabetes, or chronic respiratory disease between ages 30 and 70
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol	id.3.5.1	Coverage of treatment interventions (pharmacological, psychosocial and rehabilitation and aftercare services) for substance use disorders

Annex III (*continued*)

Goal	Target	Indicator	Indicator
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents	id.3.6.1	Number of road traffic fatal injury deaths per 100 000 population (age-standardized)
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.7 By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes.	id.3.7.1	Percentage of women of reproductive age (15-49 years) who have their need for family planning satisfied with modern methods.
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.7 By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes.	id.3.7.2	Adolescent birth rate (10-14; 15-19) per 1,000 women in that age group
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.	id.3.8.1	Coverage of tracer interventions (e.g. child full immunization, ARV therapy, TB treatment, hypertension treatment, skilled attendant at birth, etc.)
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.	id.3.8.2	Fraction of the population protected against catastrophic/impoverishing out-of-pocket health expenditure
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.	id.3.9.1	Population in urban areas exposed to outdoor air pollution levels above WHO guideline values
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.a Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate.	id.3.a.1	Tobacco use among persons 18 years and older Age-standardized prevalence of current tobacco use among persons aged 18 years and older
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.b Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all.	id.3.b.1	Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all.
Goal 3 Ensure healthy lives and promote well-being for all at all ages	Target 3.c Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States.	id.3.c.1	Health worker density and distribution
Goal 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Target 4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes.	id.4.1.1	Percentage of children/young people at the end of each level of education achieving at least a minimum proficiency level in (a) reading and (b) mathematics. Disaggregations: sex, location, wealth (and others where data are available)

Annex III (*continued*)

Goal	Target	Indicator	Indicator
Goal 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Target 4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education.	id.4.2.1	Percentage of children under 5 years of age who are developmentally on track in health, learning and psychosocial well-being Disaggregations: sex, location, wealth (and others where data are available)
Goal 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Target 4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university	id.4.3.1	Participation rate of adults in formal and non-formal education and training in the last 12 months
Goal 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Target 4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship	id.4.4.1	Percentage of youth/adults with ICT skills by type of skill
Goal 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Target 4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations.	id.4.5.1	Parity indices (female/male, urban/rural, bottom/top wealth quintile] for all indicators on this list that can be disaggregated
Goal 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Target 4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy.	id.4.6.1	Percentage of the population in a given age group achieving at least a fixed level of proficiency in functional (a) literacy and (b) numeracy skills. Disaggregations: sex, location, wealth (and others where data are available)
Goal 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Target 4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.	id.4.7.1	Percentage of 15-year old students enrolled in secondary school demonstrating at least a fixed level of knowledge across a selection of topics in environmental science and geoscience. The exact choice/range of topics will depend on the survey or assessment in which the indicator is collected. Disaggregations: sex and location (and others where data are available)
Goal 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Target 4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all	id.4.a.1	Percentage of schools with access to (i) electricity; (ii) Internet for pedagogical purposes (iii) basic drinking water and (iv) basic sanitation facilities; and (v) basic handwashing facilities (as per the WASH indicator definitions)
Goal 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Target 4.c By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States	id.4.c.1	Percentage of teachers in (i) pre-primary (ii) primary, (iii) lower secondary and (iv) upper secondary education who have received at least the minimum organized teacher (i.e. pedagogical training) pre-service or in-service required for teaching at the relevant level in a given country. Disaggregations: sex (and others where data are available)
Goal 5 Achieve gender equality and empower all women and girls	Target 5.2 Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation.	id.5.2.1	Proportion of ever-partnered women and girls (aged 15-49) subjected to physical and/or sexual violence by a current or former intimate partner, in the last 12 months

Annex III (*continued*)

Goal	Target	Indicator	Indicator
Goal 5 Achieve gender equality and empower all women and girls	Target 5.2 Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation.	id.5.2.2	Proportion of women and girls (aged 15-49) subjected to sexual violence by persons other than an intimate partner, since age 15
Goal 5 Achieve gender equality and empower all women and girls	Target 5.3 Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation.	id.5.3.1	Percentage of women aged 20-24 who were married or in a union before age 18 (i.e. child marriage)
Goal 5 Achieve gender equality and empower all women and girls	Target 5.3 Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation.	id.5.3.2	Percentage of girls and women aged 15-49 years who have undergone FGM/C, by age group (for relevant countries only)
Goal 5 Achieve gender equality and empower all women and girls	Target 5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life.	id.5.5.1	Proportion of seats held by women in national parliaments
Goal 5 Achieve gender equality and empower all women and girls	Target 5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life.	id.5.5.2	Proportion of seats held by women in local governments
Goal 5 Achieve gender equality and empower all women and girls	Target 5.6 Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences.	id.5.6.1	Proportion of women (aged 15-49) who make their own sexual and reproductive decisions.
Goal 5 Achieve gender equality and empower all women and girls	Target 5.b Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women.	id.5.b.1	Proportion of individuals who own a mobile telephone, by sex
Goal 6 Ensure availability and sustainable management of water and sanitation for all	Target 6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all.	id.6.1.1	Percentage of population using safely managed drinking water services
Goal 6 Ensure availability and sustainable management of water and sanitation for all	Target 6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all.	id.6.1.2	Average weekly time spent in water collection (including waiting time at public supply points), by sex, age, location and income.
Goal 6 Ensure availability and sustainable management of water and sanitation for all	Target 6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.	id.6.2.1	Percentage of population using safely managed sanitation services
Goal 6 Ensure availability and sustainable management of water and sanitation for all	Target 6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.	id.6.3.1	Percentage of wastewater safely treated , disaggregated by economic activity
Goal 6 Ensure availability and sustainable management of water and sanitation for all	Target 6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.	id.6.3.2	Percentage of receiving water bodies with ambient water quality not presenting risk to the environment or human health
Goal 6 Ensure availability and sustainable management of water and sanitation for all	Target 6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.	id.6.4.2	Percentage of total available water resources used, taking environmental water requirements into account (Level of Water Stress)

Annex III (*continued*)

Goal	Target	Indicator	Indicator
Goal 6 Ensure availability and sustainable management of water and sanitation for all	Target 6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	id.6.5.1	Degree of integrated water resources management (IWRM) implementation (0-100)
Goal 6 Ensure availability and sustainable management of water and sanitation for all	Target 6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.	id.6.6.1	Percentage of change in wetlands extent over time
Goal 6 Ensure availability and sustainable management of water and sanitation for all	Target 6.b Support and strengthen the participation of local communities in improving water and sanitation management.	id.6.b.1	Support and strengthen the participation of local communities in improving water and sanitation management.
Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all	Target 7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	id.7.1.1	Percentage of population with electricity access (%)
Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all	Target 7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	id.7.1.2	Percentage of population with primary reliance on non-solid fuels (%)
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Target 8.7 Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms.	id.8.7.1	Percentage and number of children aged 5-17 years engaged in child labour, per sex and age group (disaggregated by the worst forms of child labour)
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Target 8.8 Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment	id.8.8.1	Frequency rates of fatal and non-fatal occupational injuries and time lost due to occupational injuries by gender and migrant status
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Target 8.8 Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment	id.8.8.2	Number of ILO conventions ratified by type of convention.
Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Target 9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	id.9.1.1	Share of the rural population who live within 2km of an all season road
Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Target 9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	id.9.1.2	Passenger and freight volumes
Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Target 9.c Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020	id.9.c.1	Percentage of the population covered by a mobile network, by technology
Goal 10 Reduce inequality within and among countries	Target 10.2 By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status	id.10.2.1	Proportion of people living below 50% of median income disaggregated by age and sex
Goal 10 Reduce inequality within and among countries	Target 10.3 Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard	id.10.3.1	Percentage of population reporting having personally felt discriminated against or harassed within the last 12 months on the basis of a ground of discrimination prohibited under international human rights law

Annex III (*continued*)

Goal	Target	Indicator	Indicator
Goal 10 Reduce inequality within and among countries	Target 10.7 Facilitate orderly, safe, regular and responsible migration and mobility of people, including through the implementation of planned and well-managed migration policies	id.10.7.3	Number of detected and non-detected victims of human trafficking per 100,000; by sex, age and form of exploitation
Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable	Target 11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums	id.11.1.1	Proportion of urban population living in slums
Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable	Target 11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons	id.11.2.1	Proportion of the population that has a public transit stop within 0.5 km
Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable	Target 11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations	id.11.5.1	Number of deaths, missing people, injured, relocated or evacuated due to disasters per 100,000 people.
Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable	Target 11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	id.11.6.1	Percentage of urban solid waste regularly collected and well managed (disaggregated by type of waste)
Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable	Target 11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	id.11.6.2	Level of ambient particulate matter (PM 10 and PM 2.5)
Goal 12 Ensure sustainable consumption and production patterns	Target 12.2 By 2030, achieve the sustainable management and efficient use of natural resources	id.12.2.1	Material footprint (MF) and MF/capita
Goal 12 Ensure sustainable consumption and production patterns	Target 12.3 By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses	id.12.3.1	Global Food Loss Index (GFLI)
Goal 12 Ensure sustainable consumption and production patterns	Target 12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	id.12.5.1	National recycling rate, tonnes of material recycled
Goal 12 Ensure sustainable consumption and production patterns	Target 12.a Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production	id.12.a.1	Number of qualified green patent applications
Goal 12 Ensure sustainable consumption and production patterns	Target 12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products	id.12.b.1	Residual flows generated as a result of tourism direct GDP (derived from an extended version of the System of Environmental-Economic Accounting (SEEA) for tourism)
Goal 13 Take urgent action to combat climate change and its impacts (Acknowledging that the United Nations Framework Convention on Climate Change is the primary international, intergovernmental forum for negotiating the global response to climate change.)	Target 13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	id.13.1.1	Number of deaths, missing people, injured, relocated or evacuated due to disasters per 100,000 people.
Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Target 14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution	id.14.1.1	Nitrogen use efficiency composite indicator

Annex III (*continued*)

Goal	Target	Indicator	Indicator
Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Target 14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans	id.14.2.1	% of coastal and marine development (to be defined) with formulated or implemented ICM/MSP plans (that are harmonized where applicable), based on an ecosystem approach, that builds resilient human communities and ecosystems and provides for equitable benefit sharing and decent work
Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Target 14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels	id.14.3.1	Average marine acidity (pH) measured at agreed suite of representative sampling stations
Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Target 14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics	id.14.4.1	Proportion of fish stocks within biologically sustainable level
Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Target 14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information	id.14.5.1	Coverage of protected areas
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.	id.15.2.1	Forest cover under sustainable forest management
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world	id.15.3.1	Trends in land degradation
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development	id.15.4.1	Coverage of protected areas
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development	id.15.4.2	Mountain Green Cover Index
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity, and, by 2020, protect and prevent the extinction of threatened species	id.15.5.1	Red List Index
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.7 Take urgent action to end poaching and trafficking of protected species of flora and fauna and address both demand and supply of illegal wildlife products	id.15.7.1	Red List Index for species in trade

Annex III (*continued*)

Goal	Target	Indicator	Indicator
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.1 Significantly reduce all forms of violence and related death rates everywhere	id.16.1.1	Number of victims of intentional homicide by age, sex, mechanism and where possible type of perpetrator, per 100,000 population
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.2 End abuse, exploitations, trafficking and all forms of violence against and torture of children	id.16.2.1	Percentage of children aged 1-14 years who experienced any physical punishment by caregivers in the past month
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.2 End abuse, exploitations, trafficking and all forms of violence against and torture of children	id.16.2.2	Number of detected and non-detected victims of human trafficking per 100,000; by sex, age and form of exploitation
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.3 Promote the rule of law at the national and international levels and ensure equal access to justice for all	id.16.3.1	Percentage of victims of violence in the previous 12 months who reported their victimization to competent authorities or other officially recognized conflict resolution mechanisms (also called crime reporting rate)
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.3 Promote the rule of law at the national and international levels and ensure equal access to justice for all	id.16.3.2	Unsentenced detainees as percentage of overall prison population
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.4 By 2030, significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime	id.16.4.1	Total value of inward and outward illicit financial flows (in current US$).
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.4 By 2030, significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime	id.16.4.2	Percentage of seized and collected firearms that are recorded and traced, in accordance with international standards and legal instruments
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.5 Substantially reduce corruption and bribery in all their forms	id.16.5.1	Percentage of persons who had at least one contact with a public official, who paid a bribe to a public official, or were asked for a bribe by these public officials, during the last 12 months. Disaggregate by age, sex, region and population group. This concept of bribery prevalence makes clear that it has to be measured amongst those who had contact with a public official.
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.9 By 2030, provide legal identity for all, including birth registration	id.16.9.1	Percentage of children under 5 whose births have been registered with civil authority
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.10 Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements	id.16.10.1	Number of verified cases of killing, kidnapping, enforced disappearance, arbitrary detention and torture of journalists, associated media personnel, trade unionists and human rights advocates in the previous 12 months

Annex III (*continued*)

Goal	Target	Indicator	Indicator
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.a Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime	id.16.a.1	Percentage of victims who report physical and/or sexual crime to law enforcement agencies during past 12 months Disaggregated by age, sex, region and population group
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.b Promote and enforce non-discriminatory laws and policies for sustainable development	id.16.b.1	Percentage of population reporting having personally felt discriminated against or harassed within the last 12 months on the basis of a ground of discrimination prohibited under international human rights law. Disaggregate by age, sex, region and population group
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.6 Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism.	id.17.6.1	Access to patent information (WIPO Patent Database) and use of the international IP system
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.8 Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology	id.17.8.1	Proportion of individuals using the Internet.
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.18 By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts	id.17.18.1	Proportion of sustainable development indicators with full disaggregation produced at the national level.
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.19 By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries	id.17.19.2	Inclusive Wealth Index
Goal 1 End poverty in all its forms everywhere	Target 1.a Ensure significant mobilization of resources from a variety of sources, including through enhanced development cooperation, in order to provide adequate and predictable means for developing countries, in particular least developed countries, to implement programmes and policies to end poverty in all its dimensions.	id.1.a.1	Share of total overall government spending (incl. subnationals) on programs directed to bottom 40% of population of country (%).
Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Target 2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.	id.2.3.1	Value of production per labour unit (measured in constant USD), by classes of farming/pastoral/forestry enterprise size

Annex III (*continued*)

Goal	Target	Indicator	Indicator
Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Target 2.a Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries.	id.2.a.1	The Agriculture Orientation Index (AOI) for Government Expenditures
Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Target 2.b Correct and prevent trade restrictions and distortions in world agricultural markets, including through the parallel elimination of all forms of agricultural export subsidies and all export measures with equivalent effect, in accordance with the mandate of the Doha Development Round.	id.2.b.2	Agricultural Export Subsidies
Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Target 2.c Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility.	id.2.c.1	Indicator of (food) Price Anomalies (IPA) (CBB)
Goal 6 Ensure availability and sustainable management of water and sanitation for all	Target 6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.	id.6.4.1	Percentage change in water use efficiency over time.
Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all	Target 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	id.7.2.1	Renewable energy share in the total final energy consumption (%)
Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all	Target 7.3 By 2030, double the global rate of improvement in energy efficiency	id.7.3.1	Rate of improvement in energy intensity (%) measured in terms of primary energy and GDP
Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all	Target 7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology	id.7.a.1	Improvement in the net carbon intensity of the energy sector (GHG/TFC in CO2 equivalents)
Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all	Target 7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries and small island developing States	id.7.b.1	Ratio of value added to net domestic energy use, by industry.
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Target 8.1 Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries	id.8.1.1	GDP per capita, PPP
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Target 8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value-added and labour-intensive sectors	id.8.2.1	Growth rate of GDP per employed person

Annex III (*continued*)

Goal	Target	Indicator	Indicator
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Target 8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services	id.8.3.1	Share of informal employment in non-agriculture employment by sex.
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Target 8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production, with developed countries taking the lead	id.8.4.1	Resource productivity.
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Target 8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	id.8.5.1	Average hourly earnings of female and male employees by occupations (Wages/Gender wage gap)
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Target 8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	id.8.5.2	Unemployment rate by sex, age-group and disability.
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Target 8.6 By 2020, substantially reduce the proportion of youth not in employment, education or training	id.8.6.1	Percentage of youth (15-24) not in education, employment or training (NEET)
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Target 8.9 By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products	id.8.9.1	Tourism direct GDP (as % of total GDP and in growth rate); and Number of jobs in tourism industries (as % total jobs and growth rate of jobs, by gender)
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Target 8.10 Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all	id.8.10.1	Number of commercial bank branches and ATMs per 100,000 adults
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Target 8.10 Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all	id.8.10.2	% adults with a formal account or personally using a mobile money service in the past 12 months". Possible to have a break down by income e.g. bottom 40% of income share or <$1.25/day, by gender, age (youth) and rural. Adults: ages 15+
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	Target 8.b By 2020, develop and operationalize a global strategy for youth employment and implement the Global Jobs Pact of the International Labour Organization	id.8.b.1	Total government spending in social protection and employment programmes as percentage of the national budgets and GDP and collective bargaining rates
Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Target 9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries	id.9.2.1	Manufacturing Value Added (share in GDP, per capita, % growth)
Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Target 9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries	id.9.2.2	Manufacturing employment, in percent to total employment

Annex III (*continued*)

Goal	Target	Indicator	Indicator
Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Target 9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets	id.9.3.1	Percentage share of (M) small scale industries' value added in total industry value added
Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Target 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities	id.9.4.1	Carbon emission per unit of value added
Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Target 9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending	id.9.5.1	R&D expenditure as percentage of GDP
Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Target 9.a Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States	id.9.a.1	Amount of investments in infrastructure as a % of GDP
Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Target 9.b Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities	id.9.b.1	Percentage share of medium and high-tech (MHT) industry value added in total value added
Goal 10 Reduce inequality within and among countries	Target 10.1 By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average	id.10.1.1	Growth rates of household expenditure or income per capita among the bottom 40 percent of the population and the total population
Goal 10 Reduce inequality within and among countries	Target 10.4 Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality	id.10.4.1	Labour share of GDP, comprising wages and social protection transfers.
Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable	Target 11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries	id.11.3.1	Efficient land use
Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable	Target 11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage	id.11.4.1	Share of national (or municipal) budget which is dedicated to preservation, protection and conservation of national cultural natural heritage including World Heritage sites
Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable	Target 11.c Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials	id.11.c.1	Percentage of financial support that is allocated to the construction and retrofitting of sustainable, resilient and resource-efficient buildings

Annex III (*continued*)

Goal	Target	Indicator	Indicator
Goal 12 Ensure sustainable consumption and production patterns	Target 12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities	id.12.c.1	Amount of fossil fuel subsidies, per unit of GDP (production and consumption), and as proportion of total national expenditure on fossil fuels
Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Target 14.6 By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation	id.14.6.1	Dollar value of negative fishery subsidies against 2015 baseline
Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Target 14.7 By 2030, increase the economic benefits to Small Island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism	id.14.7.1	Fisheries as a % of GDP
Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Target 14.a Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries	id.14.a.1	Budget allocation to research in the field of sustainable marine technology as a percentage of all research in field of marine technology
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	id.15.1.1	Forest area as a percentage of total land area
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	Target 16.6 Develop effective, accountable and transparent institutions at all levels	id.16.6.1	Primary government expenditures as a percentage of original approved budget
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.1 Strengthen domestic resource mobilization, including through international support to developing countries, to improve domestic capacity for tax and other revenue collection	id.17.1.1	Composition of Tax Revenues (by sources), including revenues derived from environmental taxes, and as % of GDP

Annex III (*continued*)

Goal	Target	Indicator	Indicator
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.2 Developed countries to implement fully their official development assistance commitments, including the commitment by many developed countries to achieve the target of 0.7 per cent ODA/GNI to developing countries and 0.15 to 0.20 per cent of ODA/GNI to least developed countries; ODA providers are encouraged to consider setting a target to provide at least 0.20 per cent of ODA/GNI to least developed countries.	id.17.2.1	Net ODA, total and to LDCs, as percentage of OECD/Development Assistance Committee (DAC) donors' gross national income (GNI)
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.3 Mobilize additional financial resources for developing countries from multiple sources	id.17.3.1	Total Capital Inflow (TCI)
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.4 Assist developing countries in attaining long-term debt sustainability through coordinated policies aimed at fostering debt financing, debt relief and debt restructuring, as appropriate, and address the external debt of highly indebted poor countries to reduce debt distress	id.17.4.1	Debt service as a percentage of exports of goods and services
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.7 Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed	id.17.7.1	Average applied tariffs imposed on environmental Goods
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.13 Enhance global macroeconomic stability, including through policy coordination and policy coherence	id.17.13.1	GDP
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development	Target 17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships	id.17.17.1	Amount of US$ committed to public-private partnerships