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Application of a Green-Jobs SAM with Employment and CO_2 Satellites for Informed Green Policy Support: The Case of Indonesia

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Application of a Green-Jobs SAM with Employment and CO_2 Satellites for Informed Green Policy Support: The Case of Indonesia [1]

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1. Introduction to Counter-factual Simulation Scenarios, Indonesia Fiscal Stimulus Package Set-up

The adoption of green jobs technology is key to sustainable economic development (ILO, UNDP) and growth (green growth, OECD, IMF) and can be the best response to the world-wide challenges to environmental protection and economic development with social inclusion. By engaging governments, workers and employers as active change actors, the ILO encourages the greening of enterprises, workplace practices and the labour market. These efforts generate decent jobs, enhance resource efficiency and build low-carbon sustainable socio-economies. Green jobs (GJ) are decent jobs that contribute to preserve or restore the environment, i.e. via traditional sectors such as construction, agriculture or manufacturing, or via new "green economy" sectors, such as renewable energy and energy efficiency.

As a result, most economies are attempting to shift to more environmentally friendly technologies, among others, to improve labour conditions and reduce emissions. The GJ-SAM-based analysis, combined with scenario simulation, can provide helpful inputs for policy discussion and decision-making. Hence, it is important to identify appropriate quantifiable policy instruments to help policy makers to better understand linkages and transmission mechanisms that take into account environmental degradation and the technology/sectoral implications and their impacts on growth, employment and emissions.

The transition towards green economy needs to be well assessed and consequently needs to be supported by appropriate public policies, which may include skills training and re-orientation toward green activities, social protection to counter income loss, and support for labour and skill shifts from brown to green jobs. Then the transition has to be well planned, managed and implemented.

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1 The Indonesia DySAM is one of four DySAM project of EMP/INEVST-ILO Geneva between 2009 and 2015. The other country projects are Mozambique, Malaysia and South Africa. There is also a DySAM develop for Venezuela sponsored by the Venezuela Central Bank.

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The methodology is based on deriving SAM based potential indicators and the use of scenario analysis to assess policies aiming at the greening of the economy with better quality jobs. The problem of dated SAM[5] is tackled by using the latest SAM extracted from the dynamic SAM algorithm (DySAM). The DySAM generates a series of SAMs, all consistent with a benchmark SAM (BMS), the SNA and other relevant time series data.

To derive SAM-based transparent potential indicators and set-up scenarios a GJ-ESAM was built. This required expanding the SAM with green-jobs technology satellites and to extend it with employment (youth and gender) and CO_2 emission satellite modules. This allowed setting-up counter-factual green-jobs vs. brown-jobs scenario simulations to test green-jobs sectors performance *vis-à-vi* brown/hybrid job technology sectors.

The following potential indicators are derived:

- Economy multipliers, total, partial and cross-account linkages;
- Intra and induced impact multipliers;
- Employment cumulative impact indicators and direct multipliers;
- CO_2 emission cumulative activity and household consumption impact indicators, partial and cross-activity/household indicators

Counter-factual fiscal stimulus package type scenario simulations can help test green-jobs sectors performance *vis-à-vi* brown-jobs sectors, in particular, and hybrid sectors, in general, by providing insights into how to comparatively evaluate policies aimed at shifting towards ecologically friendly technologies. Such simulations can highlight best policy options to attain higher economic, income and employment growth and reduce pollution, by tracing potential instruments, quantifying indicators and scenario impacts.

Concretely two types of simulations can be performed when using SAM static modelling methods; one can be labelled as “classic” and other as “structural’. In our case capital short-term impacts via investments are measured before they reach maturity. The “classic” single period refers to simulating once-for-all changes in the values of the exogenous account entries, e.g. changing the commodity level of fixed capital, subsidies, exports, etc., while “structural” simulations refer to altering the expenditure structures (production or consumption structures). Further, “classic” and “structural” simulation scenarios can be performed within a static or a dynamic context, for the latter case the DySAM algorithm can be used because it allows simulating dynamic structural changes over time and thus allowing for the development of structural simulation paths.

When factual or counterfactual scenario simulations are performed with a static SAM model, scenarios can be assumed to directly affect via specially designated exogenous accounts or by shifting structures, subsequently comprehensive economy-wide impact analysis can be performed.

In this work the last SAM generated from the DySAM is used as the basis to perform a one period[6] scenario counter-factual simulation. The scenario simulation proposed here uses the data and premises of the fiscal stimulus package (FSP) proposed by the Indonesian government to counter the onset of the 2008 economic crises, however, the scenario is set-up within the context of green-jobs

5 In all four cases the SAMs were from 2005, the DySAM was used to generate SAM from 2000 to 2012 in most of the cases.

6 One period here refers to one year, however, it can refer to an economic period when idle capacity prevails.

vs. brown-jobs technology using sectors. The main aim of the FSP counter-factual simulation is to measure impacts on the economy, employment creation and CO_2 emissions by targeting green-jobs vs. brown-jobs technology using sectors.

The scenario set-up resembles the implementation of a fiscal stimulus package via tax reliefs and/or subsidies in order to understand how to promote greener production technologies[7]. This is done by measuring impacts on all endogenous and exogenous SAM main accounts as well as employment and CO_2 emissions. This classic type of scenario can only be done via autonomous changes in exogenous accounts the commodity levels.

1.1. SAM extensions (ESAM) with Employment and CO_2 Emission Satellites

To measure impacts on employment and CO_2 the money metric SAM must be extended with physical satellites[8]. Extensions, when attached to the accounting framework, can help perform more complex and encompassing money metric economic and non-money metric analysis. Hence, extended SAM accounting-based modelling (ESAM) can be used to support and strengthen the process of developing coherent national strategies by, *inter alia*, analysing the effects of expenditure related policies, by among others, investment planning on the economy, employment and CO_2 emissions.

For the current work the money metric 2010 DySAM was first expanded to explicitly distinguish activities using green-jobs and brown-jobs technology and their corresponding commodities, i.e. to allow testing the implications of steering technology into more environmentally friendly production, with the aim of prioritizing activities that use green-jobs technology. Subsequently, to measure employment and CO_2 impacts the 2010 DySAM (was) extended with the appropriate employment and CO_2 emission satellites.[9]

It should be noted that satellite modules must match the entries of the SAM in question. The relations between the money metric SAM and the satellites can be made explicit by introducing the appropriate row and column entries connecting the satellites with the corresponding SAM accounts. Employment, CO_2 and Waste satellites and their corresponding mathematical specifications, e.g. the ESAM, are placed below the SAM; see the lower part of the next table.

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7 In 2013 a first scenario test about the implications of implementing the original FSP was done, see "Expanded 2008 Social Accounting Matrix DySAM, And Scenario Simulations, For Indonesia "ReportII_2008ExpdSAMSimulaFinal" presented in 2011"

8 In addition to employment and emissions SAM satellites can be as varied as, social indicators, demographic information and morbidity satellite tables, to name a few. The general methodology on ESAM as well as the methodology on behavioural labour satellites is based on Alarcon (Revision 2007) and applied to Bolivia in Alarcon, van Heemst and de Jong (2000). There are other methodologies, e.g. SESAME (Keuning, 1994) and UNSD Integrated environmental and economic accounts, 1993.

9 Some of the well-known satellite modules include: social module (well-being, education, health and housing etc.); demographic module (population cohorts, morbidity, fertility, household types etc.); employment and full time equivalent; Capital Stock and induced investments; natural resources and emissions; and institutional uses of financial resources (flow of funds).

Table 1: DySAM and ESAM Modular Structure with Labour, Capital, Emissions and Waste Satellites

SAM and ESAM - Extended Green-jobs Social Accounting Matrix Table								
SAM	**1a-CM**	**1b-PA**	**2-FP**	**3a-HH-OI**	**3b- Gov.**	**4-KHHOI**	**5-ROW**	**TDD**
1a – CM	0	$T_{1a, 1b}$	0	$T_{1a, 3a}$	$T_{1a, 3b}$	$T_{1a, 4}$	$T_{1a,5}$	Y_{1a}
1b – PA	$T_{1b, 1a}$	0		0	$T_{1b, 3b}$		0	Y_{1b}
2 – FP	0	$T_{2, 1b}$					$T_{2, 5}$	Y_2
3a – HH-OI		0	$T_{3a, 2}$	$T_{3a, 3a}$	$T_{3a, 3b}$		$T_{3a, 5}$	Y_{3a}
3b – Gov.	$T_{3b, 1a}$	$T_{3b, 1b}$		$T_{3b, 3a}$	$T_{3b, 3b}$		$T_{3b, 5}$	Y_{3b}
4 – KHHOI	$T_{4, 1a}$	0		$T_{4, 3a}$	$T_{4, 3b}$		$T_{4, 5}$	Y_4
5 – RoW	0	$T_{5, 1b}$	$T_{5, 2}$	$T_{5, 3a}$	$T_{5, 3b}$	$T_{5, 4}$		Y_5
TSS	E_{1a}	E_{1b}	E_2	E_{3a}	E_{3b}	E_4	E_5	
SAM Satellites	**Type**	**Specification**		**Specification**			**Specification**	
Labour	**Fix-ratio**	$\lambda_f = \beta Y_{(t)}$						
Labour	**Linear**	$\lambda_l = \beta Y_{(t)}$						
Labour	**Exponential**	$\lambda_{nl} = \beta Y^{\xi}_{nl}$						
Capital (COR)	**Fix-ratio**	$K_f = \rho Y_{(t)}$						
Capital (ICOR) (Accelerator)	**Linear**	$\Delta K_l = I_l = \rho \Delta Y_{(t)}$						
Emissions	**Fix-ratio**	$GHG_{PA} = \epsilon Y_{PA}$		$GHG_{HH}=\epsilon Y_{HH}$			GHG_{RoW}	
Waste	**Fix-ratio**	$WS_{PA} = \mu Y_{PA}$		$WS_{HH}=\epsilon Y_{HH}$			WS_{RoW}	

Where: by definition $Y_i = E_j$ and **1 Production (1a CM** = Commodities; **1b PA** = Production Activities); **2 FP** = Factors of Production; **3a HH-IO** = Households and Other Institutions (excl. Government); **3b Gov** = Government (expenditures, taxes and subsidies); **4 KHHOI** = Capital Account Households and Other Institutions (incl. government); **5 RoW** = Rest of the World (Current and capital account); λ =**Employment by Economic Activity (**sub-fix: f= fixed ratio, l= linear, nl = non-linear, ξ = elasticity); K_f =**capital stock by Economic Activity (**sub-fix: f= fixed ratio), **$\Delta K_l = I_l$** = increase in capital stock or investments (sub-fix l = linear relatives and **ρ accelerator**); **GHG** = Green House Gases emissions; WS = Waste. **Zero entries** transactions by design or default; **Blank entries** indicate that there are no transactions by definition.

In SAM modelling all impacts propagate via the endogenous account multipliers and employment and emission impacts propagates in a similar manner as the exogenous or leak variables, i.e. via the exogenous account multipliers, thus for the derivation of labour multipliers a similar formulae can be used.

The table above shows that the demand for employment (**λ_f**) is defined via a parameter **β** (labour/output ratio)[10] related to activity output[11], the **β** vector of fix-ratios represents the inverse of

10 Ideally there should a set of labour demands matching the types of labour factor's income classification shown in the SAM and the satellite show a matrix of labour/output ratios. However, most SAMs show only one type of labour income per economic activity hence is a row vector.

11 If data refers only to total employment per sector, as in the present case, then the ratio of employment per activity to total sector output (**β)** is a row vector of fixed ratios.

sectoral average labour productivity and is in fact, *albeit* the simplest, a demand for labour specification. If employment is defined as **λ** (t), the linking equation to the labour satellite can be written as:

$$\lambda_{(t)} = \beta Y_{(t)} = \beta (A Y_{(t)} + X_{(t)}) = \beta \{(I - A)^{-1} X_{(t)}\} = \beta M_a X_{(t)}$$

Where, **λ** is a vector of employment generation and **β** is the row vector (or matrix) of labour/output ratios. It stands to logic that **β** by propagating the impact via M_a into **λ** provides the link into the satellite employment account and thus the **β** $\mathbf{M_a}$ matrix is the matrix or row vector of employment-output multipliers, which mathematically is analogous to the specification that defines the matrix of exogenous multipliers, e.g. **B.** $\mathbf{M_a}$. The methodology to link with emissions/waste is also analogous; however, note that also household emission/waste must be defined. In the next table the fixed-ratio definition for all three variables and their multipliers are presented together with their ex-ante decomposition[12] into intra-transfer and induced effects.

Table 2: ESAM-Employment, Emission and Waste Intra-Account Transfer and Induced Effects

Satellite Multiplier definition and decomposition	Definition	Additive Form	Multiplicative Form
Demand for Labour: fixed labour/output ratio	$\lambda_{PA} = \beta Y_{PA}$		
Labour Intra-account transfer Effect Matrix		$\beta (I + T)$	βM_1
Labour Induced Effect Matrix		$\beta (O+C)$	$\beta \{(M_2 - I).M_1 + (M_3 - I).M_2.M_1\}$
Emission function: fixed labour/output ratio	$GHG_{PA} = \epsilon Y_{PA}$		
Emission function: fixed HHC/output ratio			
Emissions Intra-account Transfer Effects Matrix		$\epsilon (I + T)$	ϵM_1
Emissions Induced Effects Matrix		$\epsilon (O+C)$	$\epsilon \{(M_2 - I).M_1 + (M_3 - I).M_2.M_1\}$
Waste function: fixed labour/output ratio	$WS_{PA} = \mu Y_{PA}$		
Waste function: fixed HHC/output ratio	$WS_{HHC} = \mu Y_{HHC}$		
Waste Intra-account transfer Effects Matrix		$\mu (I + T)$	μM_1
Waste Induced Effects Matrix		$\mu (O+C)$	$\mu \{(M_2 - I).M_1 + (M_3 - I).M_2.M_1\}$

2. Green-jobs DySAM and Green-jobs versus Brown-jobs Scenarios

The term 'Dynamic SAM' (DySAM) describes an instrument benchmarked on an existing 'static' Social Accounting Matrix (SAM) for the economy and the available time series of national accounts as well as other time series data, e.g. government budget, external trade, money, etc. The Dynamic SAM is designed to support and strengthen national development strategies by helping to analyse various policy effects, e.g. those of investment planning on the economy among others, and specifically to explore the relationship between intensive employment strategies, green jobs and in general job creation; and ultimately track technology changes and poverty reduction over time[13].

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12 See the decomposition in Paytt and Roe (Eds.) (1987) "Social accounting matrices: A Basis for Planning", World Bank, Washington.

13 Alarcón, Jorge; Ernst, Christoph; Khondker, Bazlul; Sharma, P. D. (2011). Note that an updated version that addresses the more technical characteristics of DySAM is presented at the IIOA conference by Dr. P.D. Sharma (parallel session "Dynamic Methods I").

The Green-Jobs 2010 Indonesian ESAM[14] presented in Table 1 serves to illustrate how to derive indicators and impacts, e.g. economic, employment indicators and CO_2 emissions impacts, from clearly conceptualized numerical scenarios. And the quantified impacts provide a deeper understanding and appreciation of the workings of the economy and thus support policy formulation.

To demonstrate the policy support methodology of the model two main simulations are developed. The first simulation is made up of one pair of green-jobs vs. brown-jobs technology using sectors[15], including only construction sectors (including Government construction), referred as infrastructure fiscal stimulus package (IFSP) scenario. The second scenario is made up of three sets of non-construction green vs. brown technology using sectors and referred simply as (FSP); the first set includes all green and all brown non-construction technology using sectors, the second set, a sub-scenario, includes only the agro/land based green and brown technology using sectors and the third set, also a sub-scenario, includes only the non-agro/land based green-jobs and brown brown-jobs technology using sectors. The allocation shares of the total stimulus package (11,898 billion IDR) in each of the two main scenarios adds up to 100% for both the IFSP and FSP green-jobs as well as for the brown-jobs scenarios can be found, correspondingly, in Table 6 and Table 15.[16]

2.1. Indonesia 2010 DySAM Green-Jobs and Brown-Jobs Expansion

Table 3 shows that 10 parent sectors have been expanded[17] (colour coded grey), into 14 green-jobs (colour coded green) and 10 brown (colour coded brown); the rest are mixed or hybrid technology activities. Note that, as a result of data availability, several parent sectors show more than expansion pair and in some cases some have no green-sector pair equivalent and *vice versa*.

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14 Please note that the DySAM algorithm generate SAMs from 2001 to 2012. Originally the intention was to develop the model using the 2012, however, the needed employment series did not provide information for 2012, hence, the 2010 is used as the basis for the model.

15 It must be taken into account that green-jobs technology is a “labour” based definition and green sector is “technology” based definition.

16 In the main scenario and the two sub-scenarios a total FSP amounting to 11,898 billion rupiahs (IDR) is distributed using the shares (weights) within each scenario block, the FSP amount has been derived by adjusting the FSP for 2008 with a growth rate, the FSP of 2008 amounted to 10,816.

17 The expansion methodology has been presented in Indonesia DySAM Report: Revised with Expanded Construction Economic Activity, Indonesia Dynamic SAM Report, Concept, Methodology, Analysis and Policy Design March 2010; *International Labour Organization, Jakarta, DSI-ILO, Geneva, EMP/INVEST*. January 2015. The methodology was applied to expand the DySAM with green-jobs technology. Subsequently IGES (2014) fully revised and provided the final version green-jobs expansion for the 2010 DySAM, the version which is used here,

Table 3: Parent Sector and Expansion with Green-Jobs Technology GJ-DySAM for Indonesia

No	Parent and Hybrid sectors 2010 DySAM 27-27	Green-jobs, brown and hybrid sectors in GJ-2010 DySAM 44-44
1	Crops – 1	1. Brown Crops – 1
		2. Green organic crops -1
2	OthAg – 2	3. Brown Other agriculture -2
		4. Green sustainable plantation – 2
3	Livestock	5.Livestock
4	ForestHunt - 3	6. Brown Forest Hunt – 3
		7. Green Non-timber forest products -3
		8. Green sustainable forestry management - 4
		9. Green forest service – 5
5	Fishery – 4	10. Brown Fishery – 4
		11. Green sustainable fishing - 6
		12. Green seaweed farming – 7
6	CoalMetalPetrol	13. Coal Metal Petrol
7	MiningQuarry	14. Mining Quarry
8	FoodDrinkTobacco	15. Food Drink Tobacco
9	WeaveTextileGarmentLeather	16. Weave Textile Garment Leather
10	Wood -5	17. Brown Wood – 5
		18. Green bamboo and rattan - 8
11	PulpPaperPrint	19. Pulp Paper Print
12	MachiElectTranRep	20. Machinery Electric Transport Repair
13	Metal Process	21. Metal Process
14	ChemFertClayCement – 6	22. Petrochemical – 6
		23. Cement – 7
		24. Fertilizer Pesticide Chemical - 8
		25. Brown Rest Manufacture -9
		26. Green Recycling – 9
15	ElecGasWater – 7	27. Brown Elec Gas Water – 10
		28. Green renewable energy - 10
16	Construction – 8	
	RoadRu	29. Green construction rural roads – 11
	RoadNoRPro	30. Brown Construction Non-Rural& Provincial roads 11
	Irig Buildings	31. Brown Construction Irrigation Systems – 12
17	ConsRest – 9	32.Green building and houses – 12
		33. Green ConstWaterSupSaniWasreManagSystem – 13
18	TradeSrv	34. Trade Srv
19	Restaurant	35. Restaurant
20	HotelAffairs	36. Hotel Affairs
21	LandTrpSrv – 10	37. Brown Land transport Service – 13
		38. Green Transport - 14
22	AirWaterTrp Communication	39. Air Water Transport Communication
23	Storage OthTrpSrv	40. Storage Other Transport Service
24	BankInsurance	41. Bank Insurance
25	RealEstate BusinessSrv	42. Real Estate Business service
26	GovDefEduHlthFilm OthSrv	43. Gov Def Edu Health Film Other Service
27	OtherIndivHHSrv	44. Other Individual Service
	Total Parent Sectors 10 out of 27	Green-Jobs sectors 14 and Brown-jobs sectors 13

Source: See Annex Table 23 worksheet <BgkLnkExpGreenJobsModel>

3. 2010 Green-jobs DySAM Modelling, Analysis, Employment and CO_2 Satellites

The characteristics of an economy are best captured by assessing ‘backward’ and ‘forward’ linkages derived from the solution of the SAM multiplier model. These endogenous accounts indicators are of three of types, e.g. total, partial account and cross-account linkages. Hence, four sets of backward linkages are derived. In addition, correlations among partial and cross-account backward linkages and their impact averages are also derived. In this work only partial and cross backward linkages are presented, ranked, graphed and briefly analysed.

3.1. Correlations and Average Income, Production Partial and Cross Backward Linkages

Correlations of partial with all cross backward linkages for each endogenous account are presented, these indicators can help gauge the degree of association that may exist between them. This analysis allows, in this case, making inferences about the compatibility or lack of it between growth and incomes policies.

The partial and cross backward linkages derived using the 2010 Indonesian DySAM, see Table 4, show that if a one billion IDR injection is made, either into the commodity or activity account, the derived correlations between these two accounts (CM, PA; PA, CM) are almost unity, this is because, on the one hand, the leak out of the two is 5.8% and 8% (the complement of the endogeneity degree18) and, on the other hand, activity output reflects the fact that there is unique commodity-activity relation between these two accounts, i.e. the commodity-activity homogeneity assumption.

Correlations of production accounts, e.g. commodity (CM) and activity (PA), with factor (FP) ad institutions (HHIO) income accounts are negative, they are around minus 0.22. This implies that injection via commodities or activities will probably impact negatively on both factor incomes and institutional incomes when growth policies are favoured, i.e. growth policies are incompatible with incomes polices.

Table 4: Indonesia Green-Jobs Expanded 2010 DySAM Correlation Matrix

Correlation Matrix: Expanded Indonesian DySAM 2010				
Main Accounts	CM	PA	FP	HHIO
Commodity (CM)	1.0	0.999	0.999	0.996
Production Activity (PA)	0.978	1.0	0.999	0.996
Factors of Production (FP)	-0.220	-0.304	1.0	0.997
Household and Company (HHOI)	-0.222	-0.306	0.999	1.0
Endogeneity Degree	94.2%	92.0%	96.7%	55.1%

Source See Annex Table 23 worksheet <BgkLnkExpGreenJobsModel>

Factor incomes (FP) and institutions incomes, on the other hand, show very high correlation with each other and with production (CM and PA) they are close to unity. This is an indication that injections into either FP or HHIO accounts most probably benefit each other's growth and probably impact the growth of production accounts. The implication is that FP and HHIO incomes policies are probably fully compatible with growth and thus complementary with growth policies but not conversely.

To complement the analysis the arithmetic average of income gains per main account are presented in Table 5. The table shows that a one billion Indonesian Rupiahs (IDR) injection production, e.g. via either (CM) or (PA), generates, on average, an increase of Rupiahs close to 2.5 billion in the account itself (CM) and 2.4 on the activity account (PA), whereas if the injection is made via the activity account (PA) the impact on itself is around 2.5 and only around 1.6 billion on (CM), the lower impact on the PA account is explained by the fact that it uses domestic and imported commodities and the

18 Endogeneity degree measures the degree to which each accounts and sub-accounts have been defined to be determined by model. Hence, it plays an important role in defining the level of the multipliers and linkages. The complement of the endogeneity degree is the leakage (L), thus the higher the leakage the lower the multiplier and corresponding linkage.

latter are leaks. The average incomes of both FP and HHOI increase between 1.44 and 1.54 billion Rupiahs. The general implication is that growth policies that tend to stimulate commodities (CM) (via exports, capital formation or government demand) and activities (PA) are identical in terms of impacting each other, however, the impact regarding incomes of (FP) or (HHOI) are much lower. The main reason is that if the injection enters via CM or PA the impact on the other two accounts is only induced.

Table 5: Indonesia Green-Jobs Expanded DySAM 2010 Average Partial Backward Linkages

Average Matrix: Indonesia Expanded 2010 (Billion Indonesia Rupiahs)				
Main Accounts	CM	PA	FP	HHOI
Commodity (CM)	2.497	1.58	1.54	1.43
Production Activity (PA)	2.346	2.48	1.44	1.33
Factors of Production (FP)	1.439	1.52	1.91	0.84
Household and Company (HHOI)	1.455	1.54	1.94	1.88

Source See Annex Table 23 worksheet <BgkLnkExpGreenJobsModel>

Further, an injection of one billion Rupiahs made via the (FP) account generates Rupiahs 1.91 billion within itself and Rupiahs 1.94 billons in the institutional income account (HHOI). However, if the injection is made via the (HHOI) account the impact on itself amounts to 1.88 Rupiahs and to 0.84 billion on factors of production. The lower cross income impacts can be explained by the fact that HHOI receives additional income via remittances and transfers; this is in addition to the fact that FP incomes (especially labour incomes) are transferred almost in its entirety to the HHIO whereas the low impact on FP is a result of induced impact via production. The impacts via FP or HHOI on both production (PA and CM) are lower than 1.54, when the injection is discounted the net impact (main diagonal) is much higher on CM and PA than on themselves, i.e. when targeting incomes and not growth, whereas for production the net impact is closer to the impacts on FP and HHIO.

Correlation results seem to indicate that

- growth policies are incompatible with incomes polices
- incomes policies are fully compatible with growth and thus complementary with growth policies but not conversely

4. Scenario Simulation Improving Green vs. Brown-Jobs Infrastructure and Impacts on the Economy and Total, Youth and Female Employment

The infrastructure scenario presented in this section is made up of one pair of three green-jobs and three brown-jobs (incl. Gov.) technology construction sectors[19]. Table 6 shows the commodity allocation shares of the total IFSP (11,897.6 billion Rupiahs) for the green and the brown scenarios[20].

Table 6: Infrastructure Fiscal Stimulus Package (IFSP) Allocation by GJ and BJ Sub-sectors

IFSP Green-Jobs vs Brown Jobs - Scenario Allocates a Total of 11,897.6 Billion Rupiahs in 2010			
Simulation Green-Jobs Infrastructure IFSP Scenario Commodity Account		**Simulation Brown-Jobs Infrastructure IFSP Scenario Commodity Account**	
Capital Formation Green Commodity Targets	**Shares**	**Capital Formation Brown Commodity Targets**	**Shares**
Green Construction Rural Roads	0.45	Brown Construction non rural and provincial roads	0.60
Green Buildings and Houses	0.25	Brown Construction irrigation systems	0.26
Green Construction Water Supp. Sani Waste Management Systems	0.30	Gov Def EduHlth Film Oth SocSrv r2	0.14
All green-construction allocation	**1.00**	**All brown-construction allocation**	**1.00**

Source See Annex Table 23 worksheet <SceSimGJ&BJInfraLabMultiGraphs>.

IFSP injections are channelled via the commodity capital formation account of the three green-jobs and the three brown-jobs (incl. Gov.) technology using sectors, assuming that increasing capital formation "cC capital" implies increasing expenditures channelled via an additional external demand.

4.1. Economy-wide Impact Analysis: Infrastructure Fiscal Stimulus Package (IFSP)

When interpreting scenario results consider that green accounts for only 6 % of total production, 2.5% employment and 2.9% of emissions, while brown accounts for 19 % of production, 27 of employment and around 43.7% of emissions.

The IFSP economy-wide and employment scenario results are summarized in Table 7. The green-jobs scenario economy-wide results of the (IFSP) are presented in the upper panel while the brown-jobs results are presented in the lower panel.

19 The economic justification to simulate investments in construction as additional expenditures is fully anchored on economic theory, i.e. increases in this type of investment represent outlays without productivity impact until the projects are finished.

20 The second (FSP) scenario set-up and other details are presented in the sub-sequent section, see Sec. 6.

Table 7: 2010 Green/Brown-Jobs Economy-wide IFSP Impacts (Billion IDR) and Employment

Green-Jobs Impacts on main Accounts	Base Run 2010	GJ Scenario Run	Net IFSP Impact	GJ Growth Rate
Commodity (CM)	10,906,294.83	10,937,544.60	31,249.78	0.287%
Production Activity (PA)	10,540,684.14	10,569,942.52	29,258.38	0.278%
Factors of Production (FP)	6,064,108.80	6,080,704.94	16,596.14	0.274%
Institutions (IN)	6,234,803.36	6,251,569.25	16,765.89	0.269%
Employment	108,207,767	108,429,443	221,676	0.205%
Brown-Jobs Impacts on main Accounts	**Base Run 2010**	**BJ Scenario Run**	**Net IFSP Impact**	**BJ Growth Rate**
Commodity (CM)	10,906,294.83	10,937,069.09	30,774.27	0.282%
Production Activity (PA)	10,540,684.14	10,570,006.48	29,322.34	0.278%
Factors of Production (FP)	6,064,108.80	6,081,156.07	17,047.27	0.281%
Institutions (IN)	6,234,803.36	6,252,020.77	17,217.41	0.276%
Employment	108,207,767	108,497,020	289,253	0.267%

Source See Annex Table 23 worksheet <SceSimLabMultiSolGraphs>.

Growth rates for the commodity and activity are practically identical under both GJS and BJS, whereas under the brown-jobs scenario the growth rates for all other accounts are higher, most notably for employment implying the creation of 67,557 (30%) more labour places under the BJS.

In both scenarios most economy growth rates show impacts between 0.267% and 0.287%, levels which are in line with the fact that the total FSP of 11.9 Trillion rupiahs amounts to 0.21% of GDP.

The next table shows scenario impacts only on the targeted construction commodities.

Table 8: IFSP Impacts on all Construction Target Sectors (Billion Rupiahs) (Target share)

Green-Jobs (GJ) Scenario IFSP Results (target share)	Base Run 2010	GJ Scenario Run	IFSP GJ Net Impact	GJ growth rate
Green construction rural roads (45% target share)	171,624.32	176,987.32	5,363.01	3.1%
Brown Construction non rural and provincial roads	378,144.87	378,151.69	6.83	0.002%
Brown Construction irrigation systems	504,767.59	504,773.92	6.32	0.001%
Green building and houses (25%)	45,932.97	48,964.67	3,031.71	6.6%
Green cons. Water sup waste manag. system (30%)	166,742.25	170,371.08	3,628.83	2.18%
c GovDefEduHlthFilm OthSocSrv	521,762.14	522,060.94	298.79	0.06%
Total Green-jobs Scenario Impacts	**1,788,974.1**	**1,801,309.63**	**12,335.49**	**0.69%**
Brown-Jobs (BJ) Scenario IFSP Results	**Base Run 2010**	**BJ Scenario Run**	**IFSP BJ Net Impact**	**BJ growth rate**
Green construction rural roads	171,624.32	171,633.84	9.52	0.01%
Brown Construction non rural & provincial roads (60%)	378,144.87	385,296.32	7,151.45	1.9%
Brown Construction irrigation systems (26%)	504,767.59	507,868.94	3,101.34	0.61%
Green building and houses	45,932.97	45,988.76	55.79	0.12%
Green cons. water sup and waste management system	166,742.25	166,807.11	64.86	0.04%
GovDefEduHlthFilm OthSocSrv (14%)	521,762.1	523,765.39	2,003.25	0.38%
Total Brown-jobs Scenario Impacts	1,788,974.1	1,801,360.35	12,386.21	0.692%

Source See Annex Table 23 worksheet <SceSimLabMultiSolGraphs>.

The green-jobs scenario, upper panel, shows that the highest growth rate is for "Green buildings and houses" (6.6%), followed by "Green Construction Rural Roads" (3.1%) and "Green construction water supply and waste management system" (2.18%). Under the BJS the highest growth rate belongs to

"Construction non rural and provincial roads" (1.9%), the others are below 0.04%. Most results show a degree of correspondence with their target shares and relative absolute representation.

4.2. IFSP Impacts on Exogenous Variables and Net IFSP Cost to the Government

Table 9 presents impacts of the IFSP scenario on the exogenous accounts[21] and shows growth rates over 0.265%; note that impacts on subsidies are zero because they are simulation instruments.

Table 9: Infrastructure Fiscal Stimulus Package Impact on exogenous/leak variables (Billion IDR)

Exogenous Scenario Run	Leak Base Run	Exogenous/Leak Scenario Run Impact Simulation		
Exogenous Account	Base Values	Scenario Values	Increase	Growth Rate
ig Govt	357,046.0	357,993.2	947.2	0.265%
ig Tax	635,203.9	637,195.3	1,991.4	0.314%
ig Sub	-	-	-	
cC Capital	1,748,328.9	1,752,979.4	4,650.5	0.266%
w CurrentAC	1,739,712.1	1,744,021.6	4,309.5	0.248%

Source See Annex Table 23 worksheet <ScenLeak2010BMa>

The IFPS budget amounts to 11,897.6 billion Rupiahs, however, as a result of economic and income growth the government receives additional revenues via direct and indirect taxation, e.g. 2,938.58 billion IDR (see Table 10), henceforth, the net cost of the IFSP to the government amounts to 8,959.02 billion Rupiahs, 24.7% less than the original budget.

Table 10: Net Cost of the Construction Fiscal Stimulus Package in 2010 (Billion Rupiahs)

Injection Fiscal Stimulus Package	Impact on Government Income	Net Cost Fiscal Stimulus Package	Share of FSP increase revenue in Total
11,898	2,939	8,959	24.7%

Source See Annex Table 23 worksheet <ScenLeak2010BMa>

4.3. Simulation IFSP Green/Brown-Jobs Impact on Economic Activities

In Table 11 the construction scenario simulation impact growth rates of the top 15 activities[22] are presented, on the left hand side are the green-jobs scenario (GJS) impacts on green-jobs activities

21 For practical reasons only the impacts on the exogenous arising out of the infrastructure simulation are presented here. The impacts arising out the second scenario can of course be calculated and would certainly be different because the targets are different.

22 Only the growth rates of activities and not of commodities are presented because they are mostly identical in both scenarios. Neither the top nor the bottom numerical impacts from the brown-jobs scenario are presented here, however full graphs with all impacts are presented below. Also the commodity account is used as the entry point for simulations and activities produce the commodities, i.e. receive the impact.

(second column) and on brow-jobs activities (third column) and on right hand side are the BJS scenario impacts on brown-jobs activities (fifth column) and on green-jobs activities (last column), in both cases they are ranked according its own scenario.[23].

The overall results are consistent under both scenarios e.g. the three construction green-jobs and the three construction brown-jobs targeted are at the top together with associated construction sectors (second and fifth columns, respectively). The ranking reflects the integration degree with the rest of the economic system and the impacts depend on which of the two scenarios the construction sectors are expanding, the results under either GJS or BJS sectors show no particular pattern, aside from those that directly support the economic expansion of the construction sector.

Table 11: Green/Brown-jobs Infrastructure Scenario (IFSP) Top 15 Growth rates Activity Impacts

IFSP Scenario Simulation Ranking Green-jobs Scenario Growth Rates (target shares)	Green-Jobs IFSP Scenario Activity Growth Rates	Brown-Jobs IFSP Scenario Activity Growth Rates	IFSP Scenario Simulation Ranking Brown-jobs Scenario Growth rates (target shares)	Brown-Jobs IFSP Scenario Activity Growth Rates	Green-Jobs IFSP Scenario Activity Growth Rates
Green building and houses (25%)	6.6%	0.121%	Brown Construction non rural and provincial roads (60%)	1.9%	0.002%
Green construction rural roads (45%)	3.1%	0.006%	Brown Construction irrigation systems (26%)	0.61%	0.001%
Green construction water Supply Sani-waste managem. Systems (30%)	2.2%	0.039%	Brown Cement	0.4%	0.51%
Brown ForestrHunt	0.71%	0.375%	GovDefEduHlthFilm OthSocSrv c2 (14%)	0.38%	0.06%
Green Sustainable forestry management	0.71%	0.375%	Green Sustainable forestry management	0.38%	0.71%
Brown Cement	0.51%	0.403%	Brown ForestrHunt	0.38%	0.71%
Brown wood	0.44%	0.293%	MiningQuarry	0.34%	0.35%
MetalProces	0.35%	0.282%	Brown wood	0.29%	0.44%
MiningQuarry	0.35%	0.335%	Livestock	0.29%	0.28%
Green forest services	0.28%	0.215%	MetalProces	0.28%	0.35%
Green recycling	0.28%	0.214%	Green sustainable fishery	0.28%	0.27%
Livestock	0.28%	0.289%	Brown fishery	0.28%	0.27%
Green sustainable fishery	0.27%	0.277%	Green seaweed farming	0.28%	0.27%
Brown fishery	0.27%	0.276%	Brown crops	0.28%	0.26%
Green seaweed farming	0.265%	0.274%	Green crops	0.273%	0.257%

Source See Annex Table 23 worksheet <SceSimGJ&BJInfraLabMultiGraphs>

It is interesting to note that under the green-jobs scenario growth rates (second column) of the activities are consistently much higher than those under the brown-jobs scenario (fifth column), despite the fact that the target shares of the former are lower (see between parenthesis).

Among the top, under the GJS there are 8 green-jobs activities, four are brown-jobs and 3 are hybrid, further, and under the BJS there are also 8 are brown-jobs activities 4 are green and 3 are hybrid

23 The growth rates of activities and not of commodities are presented because the growth rates are very close, except for cement and green recycling. Further, neither the top not bottom impacts from the brown-jobs scenario simulation are presented here, however full graphs with all impacts are presented in the Annex.

Under both scenarios is interesting to find recycling, livestock, fishery, green seaweed farming and green crops (brown and green), since they are mostly household consumption related commodities, this is an indication that the household incomes that receive income transfers from the labour factor incomes tend to favour the consumption of those types of basic commodities. (See Sub-sec. 4.6)

Table 12 shows the bottom 15 sectors impacts under GJS and BJS and the ranking is according to the GJS. The table is presented only to show the sectors that are not related to either the expansion of construction as well as those types of commodities favoured by the households whose income is related to factor incomes impacted under the scenario.

Table 12: Green/Brown-jobs Infrastructure Scenario (IFSP) Bottom 15 Growth rates Activity Impacts

SAM Order	Rank Infrastructure (IFSP) Scenario Activity Account Growth Rates Ranking Green-Jobs Scenario	Green-Jobs IFSP Scenario Activity Growth Rates	Brown-Jobs IFSP Scenario Activity Growth Rates
31	Brown Construction irrigation systems	0.001%	0.614%
30	Brown Construction non rural and provincial roads	0.002%	1.891%
16	WeaveTextileGarmentLeather	0.047%	0.049%
36	Hotel Affairs	0.056%	0.055%
43	GovDefEduHlthFilm OthSocSrv	0.057%	0.384%
19	PulpPaperPrint	0.080%	0.127%
13	CoalMetalPetrol	0.082%	0.074%
20	Machinery Electrical Trans Repair Equipment	0.083%	0.082%
24	Brown Fertilizers Pesticides Chemicals	0.102%	0.116%
18	Green bamboo and rattan	0.136%	0.151%
4	Green sustainable plantation	0.144%	0.127%
40	Storage OthTrpSrv	0.146%	0.139%
28	Green renewable energy	0.157%	0.158%
27	Brown Elect Gas Water	0.159%	0.160%
22	Brown Petrochemical	0.230%	0.169%

The table shows that under the GJS all impacts on green-jobs sectors are higher than the corresponding under BJS and further, under the BJS all impacts on brown-jobs sectors are higher than the corresponding under GJS, which is expected. Hence, note that the top two brown construction sectors are targets under the BJS and they appear as part of the top 15 (see Table 11).

Among the bottom 15 there are six brown-job sectors and 3 green-jobs sectors. The fact that energy and pulp, paper, coal, machinery, storage and petrochemicals are part of the group is an indication that the expansion of construction and related sectors does not require inputs from the sectors and the corresponding income accruing to household may also be low in terms of consumption of such commodities as well.

4.4. Simulation IFSP Green/Brown-Jobs Impact on Total, Youth and Female Employment

In Table 13 the top 15 impacts on youth, female and total employment under GJS and BJS are presented. The values in the first three columns refer to impacts arising only under the GJS whereas those in the last three columns result only under the BJS. Note that the rankings in GJS and BJS are correspondingly in accordance to total employment results under each scenario.

The results cannot be consistent with the targets share levels under the GJS or BJS construction scenarios because the employment is inversely related to their average labour productivity and depends heavily on the weight of the sector in total output and total employment, e.g. crops and trade.

As already indicated above, under the BJS 289,253 jobs are created and under GJS 221,676 jobs are created or 30% more employment. The sectors that make up the top 15 under GJS and BJS mostly coincide; the exceptions are “Brown crops” and “Brown Construction non rural and provincial roads”.

The top 15 sectors create more than 92% of all employment and the BJS shows higher shares for youth and total employment and the female shares are similar.

Interestingly enough, in both scenarios several brown-jobs sectors come on top, further, under the GJS there are only two green-jobs and there are none under the BJS, i.e. green-jobs sectors depend on brown-jobs but the reverse is not true, this can explained by the fact the green-jobs sectors are a “new” development in Indonesia and the green-jobs labour concept is used in this document.

Table 13: Green/Brown-jobs Scenario Top 15 Impacts on Total, Youth and Female Employment

Top 15 Activity Labour IFSP Impact Increases Ranking Green-jobs Scenario (Target share)	GJS Youth	GJS Female	GJS Total	Top 15 Activity Labour IFSP Impact Increases Ranking Brown-jobs Scenario (Target share)	BJS Youth	BJS Female	BJS Total
Brown crops	10,405	17,792	46,784	Brown crops	11,054	18,902	49,702
Trade Services	9,989	16,131	33,118	Brown Construction non rural and provincial roads (60%)	6,918	991	43,368
RealEstate BusinessSrv	10,519	7,422	32,317	RealEstate BusinessSrv	10,461	7,381	32,139
OthIndivHHSrv	5,851	8,476	18,506	Trade Services	9,576	15,465	31,750
Brown other agriculture	2,115	4,848	12,022	Brown Construction irrigation systems (26%)	3,286	441	19,106
Livestock	3,019	4,763	11,452	OthIndivHHSrv	5,942	8,608	18,794
Brown FertPestChem	3,781	2,936	9,242	GovDefEduHlthFilm OthSocSrv (14%)	3,618	5,639	13,086
Restaurant	2,421	4,680	8,473	Brown other agriculture	2,165	4,963	12,307
Brown Land transport Services	1,728	129	6,657	Livestock	3,157	4,980	11,972
Brown wood	2,072	2,035	6,514	Brown FertPestChem	4,295	3,336	10,499
FoodDrinkTobacco	1,978	3,098	5,881	Restaurant	2,480	4,794	8,679
Brown fishery	1,316	377	4,102	Brown Land transport Services	1,671	125	6,437
Brown ForestrHunt	885	658	3,192	FoodDrinkTobacco	2,093	3,279	6,223
Green crops	693	1,184	3,114	Brown wood	1,385	1,360	4,354
Green construction rural roads (45%)	836	70	2,772	Brown fishery	1,360	389	4,238
Top 15 Sectors Totals Employment Gains	**57,607**	**74,600**	**204,145**	**Top 15 Sectors Totals Employment Gains**	**69,461**	**80,653**	**272,656**
National Employment Gains	**63,460**	**78,607**	**221,676**	**National Employment Gains**	**74,958**	**85,203**	**289,253**
GJS Share top 15 in Totals	**90.8%**	**94.9%**	**92.1%**	**BJS Share top 15 in Totals**	**92.7%**	**94.7%**	**94.3%**

Source See Annex Table 23 worksheet SceSimGJ&BJInfraLabMultiGraphs

Under the BJS the target sector with the largest injection share (60%) appears as the top second “Brown construction non rural and provincial roads” (creating 43,368 jobs), while under the GJS the targeted sector with the highest injection share is “Green construction rural roads” (45%) and appears in the

15th place (2,772 jobs). Hence, it is clear that brown-jobs stand to generate more employment than green-jobs technology using sectors. Under both scenarios "Brown crops" is the top generator of total, youth and female jobs, which is largely due to low productivity and high output share. Also notice that a number of sectors related to the provision of services and food are among the top 15.

In the next table the bottom 13 sectors in terms of job creation are presented. On the left hand side the results are impacts under the GJS ranked according total employment. On the right hand side the results are impacts under the BJS ranked according total employment.

The first observation is that there appears to be no relation between the employment results under GJS or BJS, further all together contribute only around 1% to total job creation, a clear indication that they are mainly induced impacts.

Slightly more jobs are created under the GJS than under the BJS, and creating 105 jobs or less are 5 green and two brown under GJS. Under BJS there are 8 green and no brown.

The findings reflect the fact the average labour productivity of the bottom labour creating sectors is at least fivefold that of the top labour creating sectors, in most cases coupled to capital intensive use.

Table 14: Green/Brown-jobs Scenario Bottom 13 Impacts on Total, Youth and Female Employment

Bottom 13 Activity Labour IFSP Impact Increases Ranking Green-jobs Scenario	GJS Youth	GJS Female	GJS Total	Bottom 13 Activity Labour IFSP Impact Increases Ranking Brown-jobs Scenario	BJS Youth	BJS Female	BJS Total
Green renewable energy	5	2	17	Green construction rural roads	1	0	5
Green forest services	6	4	20	Green forest services	4	3	16
Green Non-timber forest products	10	8	37	Green renewable energy	5	2	17
Brown Construction irrigation systems	7	1	39	Green building and houses	5	1	27
Brown Construction non rural and provincial roads	7	1	41	Green const watersupsanwaste management system	10	1	31
Green bamboo and rattan	17	17	54	Green Non-timber forest products	11	8	38
Storage OthTrpSrv	18	10	55	Storage OthTrpSrv	17	9	52
Green seaweed farming	33	9	102	Green bamboo and rattan	19	19	60
PulpPaperPrint	73	51	187	Green seaweed farming	34	10	105
CoalMetalPetrol	75	14	197	CoalMetalPetrol	67	13	177
Green recycling	86	35	240	Green recycling	66	27	184
HotelAffairs	97	68	243	HotelAffairs	96	67	240
MachiElecTranRep	196	141	355	Green Sustainable forestry management	74	55	265
Totals Bottom 13 Employment Gains	628	361	1,587	Bottom 13 Sectors Totals Employment Gains	814	213	1,217
National Employment Gains	63,460	78,607	221,676	National Employment Gains	75,3765	85,203	289,253
GJS Share bottom 13 in Totals	0.99%	0.48%	0.72%	BJS Share bottom 13 in Totals	1.1%	0.3%	0.42%

Source See Annex Table 23 worksheet <SceSimGJ&BJInfraLabMultiGraphs>

4.5. (IFSP) Scenario Simulation Green-Jobs and Brown-Jobs Activity Impacts

The next two figures present only activity growth rates and absolute change impact increases mainly to assess the distribution and shifts in sector's raking. The graphs show the scenario results under GJS and under BJS, the first graph presents growth rates and second one the money impacts in IDR; note that the ranking is in accordance to the results under GJS in both graphs.

The commodity data and graphs are not presented here, however it is important to mention that, as **expected, the ranking of commodities and activities in IDR do not fully correspond (see Annex Figure 9**) and when comparing the corresponding commodities and activities growth rates we find that they are mostly identical or very close, except of course for those commodities receiving the injection and their producing sectors and the sectors directly related to the expansion of construction.

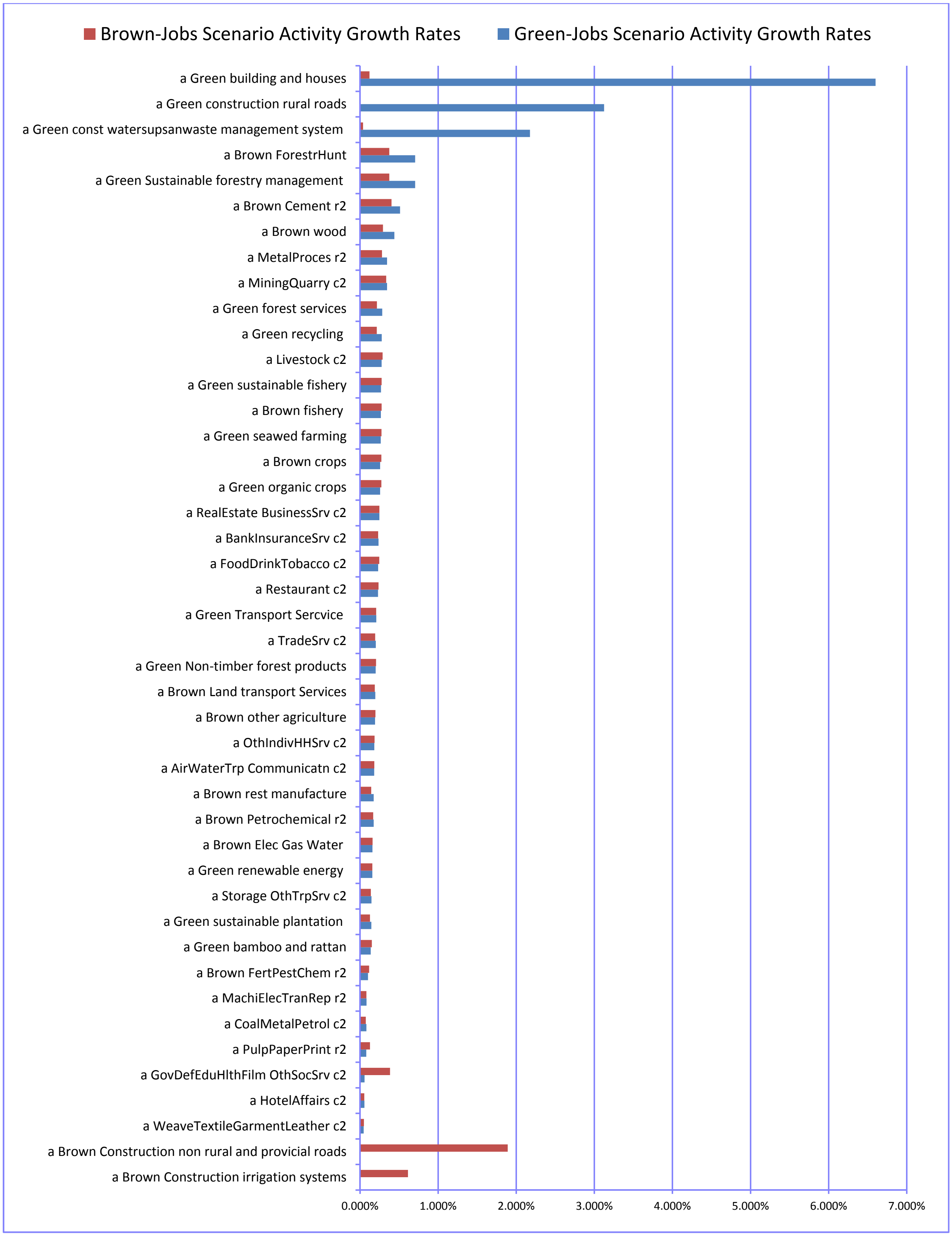
Clearly, the results and the highlights presented above for the top 15 and bottom 15 (see Table 11 and Table 12) also hold for the ones in the next figures. Hence, in as already explained, the highest impact growth rates correspond to the targeted commodities and activities.

In addition, we can see that aside from those activities at the top other activities not directly related to the expansion of construction also experience high impacts, e.g. the sectors related to consumption appear mostly in the middle, albeit with rather low growth rates, see among others, Food, Drink & Tobacco and Trade Services.24

Not surprisingly and as a result of ranking according to the GJS, we find that the targeted sectors "Brown construction of non-rural roads", "Brown irrigation systems" and government services growth rates appear at the bottom showing very high growth rates under the BJS; however, as shown before when ranked according to the BJS they will appear in among the top 15, see Table 11.

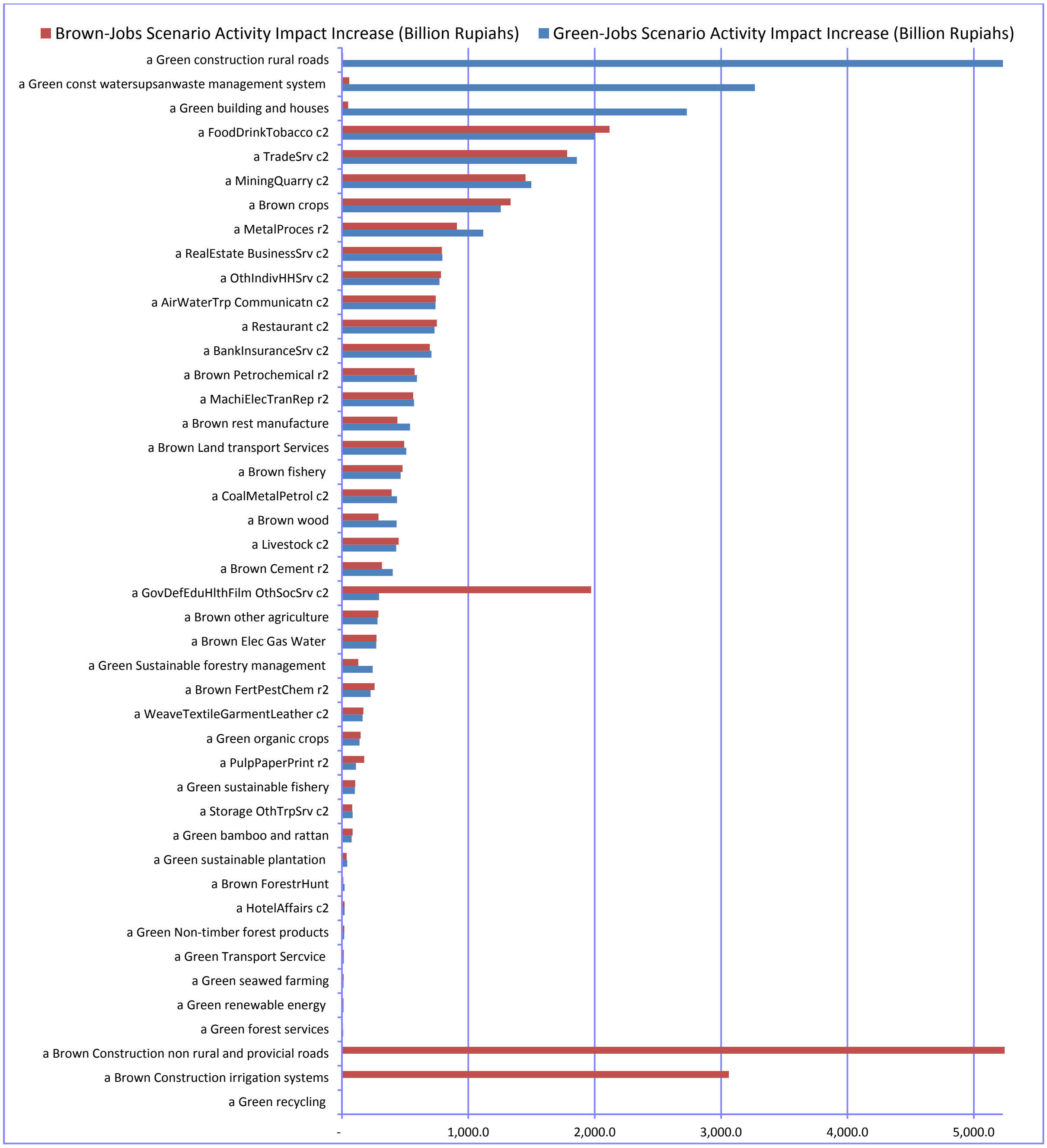
24 Source see Annex table 23 <SceSimGJ&BJInfraLabMultiGraphs>.

Figure 1: Ranking Activity Growth Rates IFSP Scenario Green/Brown-Jobs Impacts



In Figure 2 the IFSP absolute impact increase on commodity and activity accounts are ranked according to the GJS commodity simulation (blue)[25].

Figure 2: Ranking Green-Jobs Activity Scenario IFSP Impacts (Billion IDR)



25 Source see Annex Table 23 worksheet <SceSimGJ&BJInfraLabMultiGraphs> cols. DJ-DY rows 134-178.

When looking at the figure it can be clearly seen, as expected, the raking is not the same as the one with growth rates shown above, nevertheless the ranking also reflects the association of sectors with the expansion of construction, whether green-jobs or brown-jobs. In addition the presentation in money terms makes clear which ones are the most directly related and their actual contribution to the expansion of infrastructure, as explained above.

Unlike growth rates, in the middle, we find a greater mix of construction and consumption related sectors and commodities, thus reflecting their actual monetary contribution to the economy, which is clearly related to their weights. Similarly to the growth rates, and for the reasons mentioned above, the government and the two brown-jobs construction sectors appear placed in the lower half.

Finally note that after the 3rd activity the drop in impacts is very rapidly, especially the growth rates.

4.6. Simulation IFSP Impacts on Factors of Production and Institution Incomes

The IFSP absolute increase impacts on factor income are presented in Figure 3.

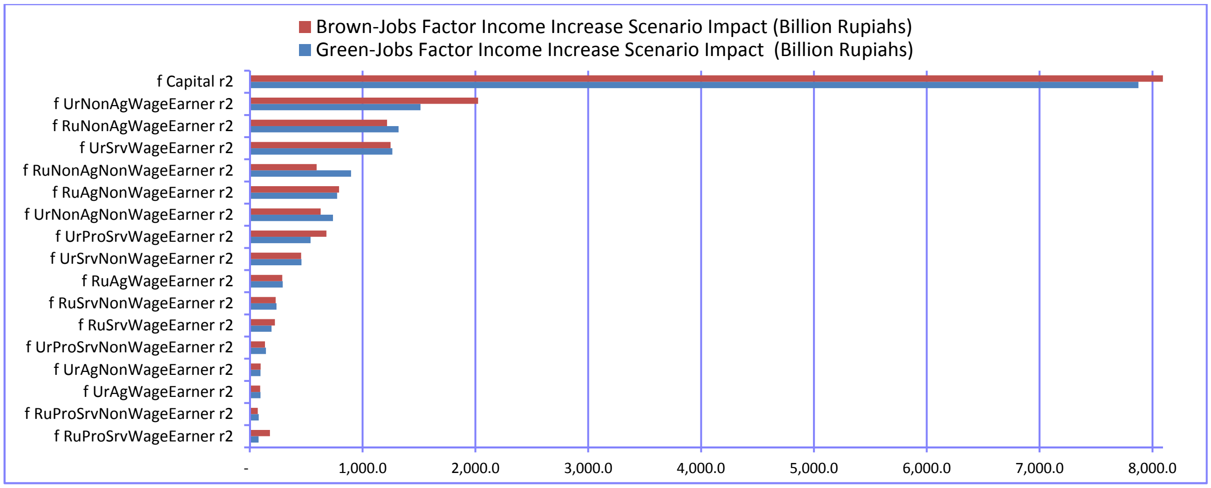
The first observation refers to the fact that under the BJS some impact are higher and for others is the reverse; clearly, since different sectors are targeted factor incomes gains and subsequent transfers are also different.

Further, confining the analysis only to impacts under the GJS (blue), the graph shows that the top corresponds to capital income with 7,875.8 billion IDR, which points out to the fact that capital plays an important role in factor income formation related to the use of more capital intensity technology. The next are non-wage earners with 1,513.7 and 1,318.9 billion IDR, correspondingly, an indication that these factors derive their income from sectors directly related to the expansion of infrastructure.

At the bottom, factors incomes the least related to the expansion of infrastructure are found to be professional and urban agriculture income receivers, with less than one tenth of those at the top receiving between 79.0 and 134.7 billion IDR.

Note that impacts under the BJS (red) are greater than under the GJS for only the first two, the 8th, 12th and the last factor, for the rest is the reverse. The overall results seem to imply that the IFSP scenario may not significantly deteriorate factor labour income distribution.

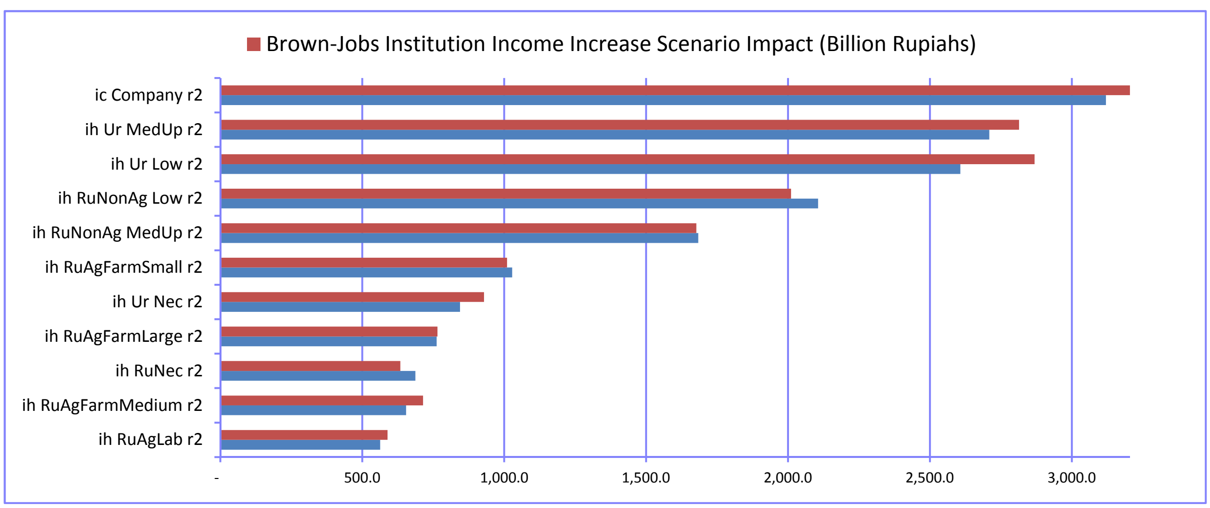
Figure 3: Green/Brown-Jobs IFSP Factor of Production Income Impact Increase (Billion IDR)



In Figure 4 the results from the IFSP simulation showing the impact on households and company (institutions income) are presented.[26]

Note that in the institutions case impacts under the BJS (red) are greater than under GJS for the first three, the 7th, 10th and the last factor, for the rest is the reverse *albeit* not significantly, i.e. targeted sectors gains generate income to their 16 labour and one capital factors, which in turn transfer income gains to 10 households and one company. The overall results seem to imply that the IFSP scenario may not significantly deteriorate factor labour income distribution.

Figure 4: IFSP Green/Brown-Jobs Impact Increases on Institutions Income (Billion IDR)



26 Source reference in Annex sheet <SceSimGJ&BJInfraLabMultiGraphs> cols DF-DT rows 239-250

Again, confining the analysis to the impacts under GJS (blue) we can see that IFSP benefit companies and two urban households with impacts incomes gains higher than 2,607 billion IDR. The top corresponds to company with 3,119.9 billion IDR; which is compatible with the factor income findings. The four and fifth are two rural non-agriculture households with impacts of 2,105 and 1,683 billion IDR, correspondingly, i.e. these factors derive their income from sectors related to the expansion of infrastructure.

At the bottom we find households deriving incomes from factors sectors least associated to the expansion of infrastructure, e.g. rural agricultural labour and medium farm household income group receivers, with less than one third of those groups at the top. Further, the four lowest are rural and receive between 563 and 765 billion IDR, there income gains are partly associated with the expansion of such sectors as forestry, wood and fishery which are among the top 15, see Table 11. The results seem to show a bias towards urban based factors.

Calculations show that growth rates, not show here, vary but not significantly; although, for policy purposes, it may be possible to ascertain that household income distribution may improve within regions, but may deteriorate across the regional divide, e.g. those receiving the least gains are rural based households. To prevent regional income deterioration GJS policies will have to be complemented with direct social transfers.

Summary IFSP Simulation findings:

- IFSP may not significantly deteriorate factor labour income distribution
- Growth rates results on targeted commodities are the highest under both scenarios
- Most targeted commodity growth impacts correspond to the level of their injection share.
- Resulting from economic and income growth the net cost of the IFSP to the government is 24.7% less than in the original budget.
- Under GJS growth rates of activities producing the targeted commodities are consistently much higher than under the brown-jobs scenario (third column), despite lower target shares.
- Within top growth rates under GJS are 8 green-jobs activities, four are brown-jobs and 3 are hybrid and under the BJS there are also 8 brown-jobs activities, 4 are green and 3 are hybrid.
- Within top growth rates under the scenarios, there are recycling, livestock, fishery, green seaweed farming and green crops (brown and green), pointing out consumption related impacts resulting from household incomes gains.

5. Scenario Simulation Green/Brown-Jobs and CO_2 Activity and Household Emission Impacts

The second scenario targets only non-construction commodities and, similarly to the earlier scenario, separates green-jobs from brown-jobs technology produced commodities are developed and run. Unlike the earlier scenario, the present one is made up of three sets of green-jobs vs. brown-jobs technology produced commodities.

More concretely the main set targets all (ALL scenario) of non-construction whether green and or brown. For analytical purposes, the ALL scenario is split in two sub-scenarios, the first sub-scenario targets only green-jobs and brown-jobs agriculture, fish and land-based produced commodities, labelled "First sub-scenario", the second sub-scenario excludes green-jobs and brown-jobs agriculture, fish and land-based produced commodities, labelled as "Second sub-scenario". Similarly to the first scenario the same FSP total amount of 11,897.6 billion rupiahs (IDR) is allocated to the ALL scenario, see Table 15.

In the table the column "Shares" shows that the total allocation adds to 100% for the ALL green-jobs simulation the same is true for the ALL brown-jobs simulation. Further, each share reflects the target commodity participation, correspondingly, in either the total of green-jobs output or the total brown-jobs output. Further, the first sub-scenario target shares of green-jobs commodities add-up to 92.4% and the corresponding brown-jobs commodities target shares add-up to 58.6%. In the second sub-scenario the green-jobs target shares add-up to 7.6% and brown-jobs target shares add-up to 41.4%, the complement. Note that although emissions are generated by economic activity and household consumption, the latter are not targeted in this work. However, a short analysis of household emission impacts arising out of the present scenario under both GJS and the BJS are presented below.

Table 15: FSP Green vs Brown Jobs Fiscal Stimulus Package (IFSP) Allocation by GJS and BJS [27]

FSP Green-Jobs vs Brown Jobs - Scenario Allocates a Total of 11,897.6 Billion Rupiahs in 2010					
IFSP Green-Jobs: All Scenario, First Sub-scenario and Second Sub-scenario			**IFSP Brown-Jobs: All Scenario, First Sub-scenario and Second Sub-scenario**		
SAM Order	Green-Jobs Scenario Allocation	Shares	SAM Order	Brow-Jobs Scenario Allocation	Shares
2	Green crops	0.203	1	Brown crops	0.313
4	Green sustainable plantation	0.118	3	Brown other agriculture	0.095
7	Green Non-timber forest products	0.039	6	Brown forestry hunting	0.002
8	Green Sustainable forestry management	0.149	10	Brown fishery	0.111
9	Green forest services	0.015	17	Brown wood	0.064
11	Green sustainable fishing	0.151	**Total Allocation First Brown-jobs Sub-scenario**		**0.586**
12	Green seaweed farming	0.019			
18	Green bamboo and rattan	0.228			
Allocation First Green-jobs Sub-scenario		**0.924**			
26	Green recycling	0.020	25	Brown rest manufacture	0.155
28	Green renewable energy	0.027	27	Brown Electricity Gas Water	0.091
38	Green Transport Service	0.029	37	Brown Land transport Services	0.168
Allocation Second Green-jobs Sub-scenario		**0.076**	**Allocation Second Brown-jobs Sub-scenario**		**0.414**
All Green-jobs scenario		**1.000**	**All Brown-jobs scenario**		**1.000**

Source See Annex Table 23 worksheet <SceSimCO$_2$MultiSolGraphs>

It should be noted that the ALL GJS scenario is made up of 11 green-jobs commodities. Further, the First GJS sub-scenario is made up of 8 green-jobs grouping only agriculture, fish and land-based produced commodities receiving 92.4% of the stimulus package total and the remaining 3, which exclude

27 For the source for the tables and graphs see Annex Table 23 worksheet <SceSimCO2MultiSolGraphs>

agriculture, fish and land-based produced commodities, make up the Second GJS sub-scenario. The ALL BJS is made up of 8 brown-jobs sector. Further, First BJS sub-scenario is made up of 5 brown-jobs grouping only agriculture, fish and land-based produced commodities and receiving 58.6% of the stimulus package total and the remaining 3, which exclude agriculture, fish and land-based produced commodities, make up the Second BJS sub-scenario.

Similarly to the first scenario, the objectives of this simulation are aimed at gaining insight about the economic impacts, however, since household also generate emissions consumption emission impacts are added to the aims of this scenario.[28]

The scenario results arising out of the ALL and the two sub-scenario sets are presented in the following sub-sections, where tables and graphs showing only CO_2 emission impact simulations are briefly discussed.

5.1. ALL Green-jobs and Brown-jobs Scenario CO_2 Emission Impacts via Production Activity

As just indicated, the CO_2 emission satellite extension is related to sectoral production and household consumption. Hence, and despite the fact that CO_2 emission multipliers have been calculated for all four main endogenous accounts, only the outcomes related to the two direct polluter accounts are presented and briefly discussed here, see next table.

Table 16 presents the impact increases on activities producing the targeted commodities under the ALL GJS and ALL BJS scenarios. As expected, activity impact increases under the ALL GJS are significantly lower (less than one third) than under the ALL BJS. Under the BJS two sectors account for more than 90% of all emission, e.g. “Brown Electricity Gas Water” (80%) and “Brown Land Transport Services” (10%) of the total BJS emission impact. And under the GJS the impacts are more spread but the “Green renewable energy” sector accounts for almost 50% the total CO_2 emissions. Under both scenarios some land-based sectors are among the highest polluters, e.g. crops, agriculture, bamboo rattan and plantations.

28 Although, economic and employment impacts can be calculated also in the scenario, for practical reasons, only CO_2 scenario impacts are presented and discussed here.

Table 16: ALL Green and ALL Brown Jobs Scenario CO_2 Emission Impacts on Targeted Sectors

Green-Jobs ALL Scenario Results FSP Simulation Agriculture-forestry-Fishery Emission CO_2 Impacts (Giga grams)			Brown ALL Scenario Results FSP Simulation Agriculture-Fishery-Wood Emission CO_2 Impacts (Giga grams)		
SAM Order	Targeted Green-Jobs	Giga grams	SAM Order	Targeted Brown-Jobs	Giga grams
46	Green Organic crops	28,593	45	Brown crops	80,812
48	Green sustainable plantation	28,046	47	Brown other agriculture	27,817
51	Green Non-timber forest products	3,833	50	Brown Forestry Hunt	549
52	Green Sustainable forestry management	17,125	54	Brown fishery	26,409
53	Green forest services	2,029	61	Brown wood	18,639
55	Green sustainable fishery	21,234	69	Brown rest manufacture	24,502
56	Green seaweed farming	2,334	71	Brown Elec Gas Water	838,792
62	Green bamboo and rattan	37,247	81	Brown Land transport Services	136,900
70	Green recycling	2,189			
72	Green renewable energy	147,236			
82	Green Transport Service	15,823			
Total Green-Jobs Scenario CO_2 Emission Impact Increase		305,774	Total Brown-Jobs Scenario CO_2 Emission Impact Increase		1,053,494

Table 17 presents the CO_2 emission volume increase results under the ALL scenario simulation of the top 15 polluting activities.[29]. The ALL GJS impacts on the left hand side and ALL BJS impacts appear on the right hand side, each is ranked according to the corresponding scenario.

As expected, under the BJS pollution total pollution is highest, e.g. 1,424,398 Gg grs as opposed to 799,748 Gg grs under the GJS. The top 15 polluters under the GJS account for 88% and 89% under BJS of all the respective pollution, the ranking is according to the GJS. The top 15 under BJS account for 96% under the BJS and 75% under the GJS, the rankings is according to the BJS. Note that under the BJS the top polluter “Brown electricity gas and water” accounts for 61% of the total pollution of the top 15 and 59% of the total pollution, the sectors is clear target if the aim is to reduce pollution significantly.

On the whole, the top 15 do not show direct relation with the scenario target shares but they show a 69% association with the sectors’ target levels in both scenarios, while the association for all 44 sectors is 71%. The results reflect, of course, the strong way in which the top polluting sectors interact throughout the economic system both via production and consumption.

The table clearly shows that under both scenarios “Mining & Quarry” is the third top polluter while the rest of the top 15 contributions, on whole, show lower levels of pollution. Note also that under the GJS we find 7 green-jobs sectors out of all 14, an indication that green-jobs sector are not green sectors, while under the BJS there are 8 brown-jobs sectors out of all 13, and the combined CO_2 pollution level of the former sectors remains considerable lower than that of the latter.

29 The growth rates of activities and not of commodities are presented because they are very close to each other, except for cement and green recycling. Further, the neither the top not bottom impacts from the brown-jobs scenario simulation are presented here, however full graphs with all impacts are presented.

Table 17: Top 15 Polluting ALL Green/Brown-Jobs Activity Scenario Increases CO_2 Emission (Gg grs)

Top Polluting Activity CO_2 Emission Green-Jobs and Brown-Jobs **All Scenario** (Target)	**All Green-Jobs** CO_2 Activity Increase	**ALL Brown-Jobs** CO_2 Activity Increase	**Top Polluting** Activity CO_2 Emission Brown-Jobs and Brown-Jobs **All Scenario**	**ALL Brown-Jobs** CO_2 Activity Increase	**All Green-Jobs** CO_2 Activity Increase
Brown Electricity Gas Water	173,499	838,792	Brown Electricity Gas Water (9.1%)	838,792	173,499
Green renewable energy (2.7%)	147,236	8,529	Brown Land trans. Serv. (T 16.8%)	136,900	27,975
MiningQuarry	112,540	108,343	MiningQuarry	108,343	112,540
Green bamboo and rattan (22.8%)	37,247	989	Brown crops (Target 31.3%)	88,812	26,584
Green crops (Target 20.3%)	28,593	1,894	Brown other agriculture (T 9.5%)	27,817	7,658
Green sustain. plantation (11.8%)	28,046	2,802	Brown fishery (T 11.1%)	26,409	7,749
Brown Land transport Services	27,975	136,900	Brown rest manufacture (T 15.5%)	24,502	1,830
Brown crops	26,584	88,812	Brown FertPestChem	24,420	14,859
Food Drink Tobacco	24,981	23,650	FoodDrinkTobacco	23,650	24,981
Green sustainable fishery (15.1%)	21,319	1,243	Brown wood (T 6.4%)	18,639	10,319
Green Sustainable forestry management (Target 14.9%)	17,125	945	AirWaterTrasp. Communicatn	14,627	14,757
Green Transport Service (T 2.9%)	15,823	662	Trade Services	9,367	9,720
Brown Ferti. Pesticides Chemicals	14,859	24,420	Livestock	8,696	8,785
Air WaterTrasp. Communicat.	14,757	14,627	WeaveTextileGarm.leath	8,630	9,558
Brown wood	10,319	18,639	Green renewable energy	8,529	147,236
Top 15 Green-Jobs CO_2 Emission	**700,982 (88%)**	**1,271,246 (89%)**	**Top 15 Brown-Jobs CO_2 Emission**	**1,368,133 (96%)**	**598,048 (75%)**
All Sectors Green-Jobs CO_2 Emission	**799,748**	**1,424,398**	**All Sectors Green-Jobs CO_2 Emission**	**1,424,398**	**799,748**

The next table present the lowest 15 polluting sectors.

On a comparative basis the impacts under each of the brown-jobs sectors are on the whole much higher than those under GJ sectors. Since ranking is according to the GJS the targeted under BJS “Brown rest of manufacture” shows emission levels that compare more favourably to the comparison among the top 15 under the GJS see Table 17. Note that “Green recycling” and “Green forest services” (both scenario targets) show comparable emission levels to “Petrochemicals”, not a target, under both the GJS the BJS.

To finalize, note that the total of the lowest 15 CO_2 emissions combined represents only 2.1% of all emissions under GJS and 2.9% under BJS, the latter when ranked under BJS the share is only 0.4% and sectors are of course not the same. And that scenario emissions under the GJS (green column) shows that 5 are green-jobs sectors and, not surprisingly, 3 green-jobs non- targeted construction sectors appears as lower polluters with comparable levels under BJS the GJS scenarios.

Table 18: Least 15 Polluting Activity Increase CO_2 Emission in ALL Green/Brown-Jobs (Gg grs)

Least 15 Polluting Activity Increase CO_2 Emission **All** Green-Jobs and Brown-Jobs (Giga grams)	**All Green-Jobs CO_2 Scenario**: Emission Increase	**ALL Brown-Jobs CO_2 Scenario**: Emission Increase
Brown Construction non rural and provincial roads	119	83
Hotel Affairs	148	175
Green construction rural roads	159	122
Brown Construction irrigation systems	197	342
Brown Forestry Hunt (Target)	260	549
Green building and houses	335	362
BankInsuranceSrv	560	599
Green const water sup san waste management system	926	542
GovDefEduHlthFilm OthSocSrv	1,812	1,674
Brown rest manufacture (Target)	1,830	24,502
RealEstate BusinessSrv	1,895	1,927
CoalMetalPetrol	1,914	4,996
Green forest services (Target)	2,029	76
Brown Petrochemical	2,185	4,935
Green recycling (Target)	2,189	10
Total Bottom 15 CO_2 Emissions	**16,568 (2.1%)**	**40,894 (2.9%)**

5.2. First Green-jobs and Brown-jobs Sub-scenario CO_2 Emission Impacts via Production Activity

Table 19 presents the First sub-scenario results for both under the GJS and BJS note that targets are only agriculture, fish and land-based produced commodities, see Table 15. GJS results are on the left hand side and BJS results on the right hand side, and each is ranked according to its own scenario.

The table shows, as expected, significant similarities with the raking of the top 15 shown above for the ALLS-GJS and ALL-BJS but now under ALL-GJS impacts are much higher than those under ALL-BJS, which result from having allocated 92.4% to 8 green-jobs sectors under the GJS as opposed to 56.6% to 5 brow-jobs sectors under the BJS.

Note that although “Brown electricity gas water” (a non-targeted sector) is still the highest polluter but the measured emission levels are only one tenth of the levels under the ALLS BJS, further, “Mining Quarry” (also non-targeted sector) remains as one of the top polluters showing level lower than under the ALLS. Among the top 15 we find five of the targeted green-jobs under the GJS as well as 4 of those targeted under the BJS, finally “green renewable energy” is no longer among the top 15 ALLS.

It is also important to note than other non-targeted sectors, e.g. “Food Drink Tobacco.”, “trade”, “air transport” and ‘weave textiles”, are now among the top 15 polluters under both the GJS and BJS. On the whole, the rests are sectors that are not directly related to the expansion of the targeted commodities, whether under the GJS or under the BJS, i.e. they are impacted via household consumption (food and transport).

The results from the ALL and First scenarios seem to indicate that targeting only green-jobs sectors does not guaranty that pollution levels can be drastically reduced; notice that the results are partly explained by the fact that at country level shares are low thus green-jobs technology is in its infancy and green-jobs sectors do not automatically correspond to green sectors.

Table 19: Top 15 Polluting Activity CO_2 Emission First Scenario Indonesia 2010 (Gg grs)

Top 15 Polluting Activity CO_2 Emission Green-Jobs and Brown-Jobs **First Scenario** (Giga grams)	**First Green-Jobs** CO_2 Activity Increase	**First Brown-Jobs** CO_2 Activity Increase	**Top 15 Polluting** Activity CO_2 Emission Brown-Jobs and Brown-Jobs **First Scenario**	**First Brown-Jobs** CO_2 Activity Increase	**First Green-Jobs** CO_2 Activity Increase
Brown Electricity Gas Water	138,297.6	82,524.3	Brown Elec Gas Water	82,524.32	138,297.63
Mining Quarry	104,311.0	66,575.8	Brown crops (Target 31.3%)	80,311.69	24,957.17
Green bamboo & rattan (22.8%)	37,179.5	633.8	MiningQuarry	66,575.84	104,311.02
Green crops (Target 20.3%)	28,474.8	1,276.3	Brown other agricul. (9.5%)	24,532.46	7,300.34
Green sustainable planta. (11.8%)	28,000.3	541.6	Brown fishery (Target 11.1%)	23,778.32	7,246.40
Brown Land transport Services	26,147.8	15,607.6	Brown wood (Target 6.4%)	18,448.78	10,279.45
Brown crops	24,957.1	80,311.6	Brown Land transport Serv.	15,607.60	26,147.83
Food Drink Tobacco c2	23,333.2	15,145.0	FoodDrinkTobacco	15,145.01	23,333.20
Green sustainable fishery (15.1%)	21,233.1	792.9	Brown FertPestChem	15,045.79	13,442.43
Green Sustainable forestry management (Target 1.5%)	17,101.6	862.5	AirWaterTrp Communicatn	8,268.59	13,592.90
Air WaterTrp Communication	13,592.9	8,268.5	Livestock	5,708.54	8,214.33
Brown FertPestChem	13,442.4	15,045.7	Trade Services	5,415.37	9,037.95
Brown wood	10,279.4	18,448.7	WeaveTextileGarm. Leather	4,868.22	8,900.68
Trade Services	9,037.9	5,415.3	Green renewable energy	3,043.70	5,118.72
WeaveTextileGarmentLeather	8,900.6	4,868.2	MachiElecTranRep	2,643.97	4,883.35

In Table 20 the First scenario least 15 polluting sectors are presented. Here also, the table shows some significant similarities with the raking of the lowest 15 shown above under the ALL-GJS and the ALL-BJS, correspondingly; however, since only green and brown agriculture, fish and land-based produced commodities are targeted the impacts on the rest of green-jobs and brown-jobs sectors are much lower. Notice that forestry is targeted under the BJS but is among the lowest polluters of the group, this is because the injection was only 0.2%. All the other sectors are either not directly related to the targeted, i.e. pollution levels are mainly induced, and among them are 5 green-jobs and also 5 brown-jobs sector and several service sectors.

Table 20: Least 15 Polluting Activity CO_2 Emission First Scenario Indonesia 2010 (Gg grs)

Least Polluting Activity CO_2 Emission **First Scenario** Indonesia GJ DySAM 2010 (Giga grams)	Green-Jobs **First Scenario** Agro-land/Fishery	Brown-Jobs **First Scenario** Agro-Land/Fishery based
Green recycling	8.38	4.15
Brown Construction non rural and provincial roads	53.04	32.71
Hotel Affairs	127.97	80.80
Green construction rural roads	135.00	91.17
Brown Construction irrigation systems	191.65	298.08
Brown Forestry Hunt (Target under BJS 0.2%)	256.61	535.95
Green building and houses	305.03	188.93
Bank Insurance Services	510.89	341.22
Green Transport Service	617.96	385.26
Green Const. Water Supp. Sanit. Waste management system	624.82	302.61
CoalMetalPetrol	1,399.61	1,004.33
Brown Rest Manufacture	1,516.25	805.75
GovDefEduHlthFilm Other Social Serv.	1,680.36	990.80
Real Estate Business Serv.	1,723.74	1,059.71
Brown Petrochemical	1,760.45	985.22

5.3. Second Green-jobs and Brown-jobs Scenario CO_2 Emission Impacts via Production Activity

In Table 21 the top 15 polluting sectors impacts under the Second scenario are presented, e.g. only green-jobs and brown-jobs non-agro/land based green sectors are targeted. Further, those targeted under GJS receive only 7.6% while those under the BJS receive 41.4% of the total injection.

With the exception of the energy, mining and land transport sectors, the ranking shows very little similarity with the rakings of the top 15 polluters shown above for the ALL-GJS and ALL-BJS and the First-GJS and First-BSL sub-scenarios. Further, since only 3 green and 3 brown non-agro/land based sectors are targeted, it follows that all impacts must be lower when compared with the impact under the ALLS and First scenario (see Table 17 and Table 19).

Among the highest polluters are of course those receiving the injections and note that impacts are not much lower and the rank shows changes when compared with impacts under the ALL scenario. Further, impacts are comparable to those under the First scenario. Hence, there is significant consistency with those findings, except of course for the agro/land bases sectors not targeted in the Second scenario.

Under BJS the non-target sector “Brown electricity gas water” remains by far the highest polluter, followed by “Brown land transport” and “Mining Quarry”, whereas under GJS the top polluter is “Green renewable energy”.

Table 21: Top 15 Polluting Second Scenario Green/Brown-Jobs Activity CO_2 Emissions (Gg grs)

Top 15 Polluting Activity CO_2 Emission Green-Jobs and Brown-Jobs **Second Scenario** (Giga grams)	**Second Green-Jobs** CO_2 Activity Increase	**Second Brown-Jobs** CO_2 Activity Increase	**Top 15 Polluting** Activity CO_2 Emission Brown-Jobs and Brown-Jobs **Second Scenario**	**Second Brown-Jobs** CO_2 Activity Increase	**Second Green-Jobs** CO_2 Activity Increase
Green renewable energy (Target 2.7%)	142,117.62	5,485.45	Brown Elec Gas Water (Target 9.1%)	756,267.75	35,351.07
Brown Elec Gas Water	35,351.07	756,267.75	Brown Land transport Services (Target 16.8%)	121,292.63	1,827.99
Green Transport Service (Target 2.9%)	15,205.18	276.27	MiningQuarry	41,766.89	8,233.43
MiningQuarry	8,233.43	41,766.89	Brown rest manufacture (Target 15.5%)	23,696.23	313.82
Green recycling (Target 2.0%)	2,180.79	6.22	Brown FertPestChem	9,373.95	1,418.78
Brown Land transport Services	1,827.99	121,292.63	FoodDrinkTobacco	8,505.45	1,648.40
FoodDrinkTobacco	1,648.40	8,505.45	Brown crops	8,499.84	1,627.09
Brown crops	1,627.09	8,499.84	AirWaterTrp Communicatn	6,358.42	1,164.63
Brown Cement	1,505.40	2,873.34	Green renewable energy	5,485.45	142,117.62
Brown FertPestChem	1,418.78	9,373.95	CoalMetalPetrol	3,991.93	514.90
AirWaterTrp Communication	1,164.63	6,358.42	Trade Services	3,951.78	682.50
MachiElecTranRep	881.55	2,823.35	Brown Petrochemical	3,949.68	425.24
Trade Services	682.50	3,951.78	WeaveTextileGarmentLeather	3,761.90	657.10
Weave Textile Garment Leather	657.10	3,761.90	Brown other agriculture	3,284.53	357.36
Livestock	570.55	2,987.19	OthIndivHHServices	3,037.15	286.95

Table 22 presents the lowest 15 polluting sectors impacts arising out the Second scenario under the GJS and the BJS ranked according to the GJS.

The ranking shows no similarity with the lowest 15 under the ALL neither under the First scenarios. Again, because only 3 green and 3 brown non-agro/land based sectors are targeted and the total share is lower, especially for the Second GJS (see Table 15) and it follows that impacts should be much lower than those derived for the First GJS and First BJS (see Table 20).

Further notice that under the Second GJS, 9 out the 15 are green-jobs sectors and only 4 are brown-jobs sectors are among the lowest polluters. Under the Second BJS, if ranking is done according to BJS there are 9 green-jobs sectors and 4 brown-jobs sectors, but they are not the same sectors; this is because none of them are targets of neither under the GJS nor under the BJS in the second scenario. And none of the rest sectors are related to the targeted sectors.

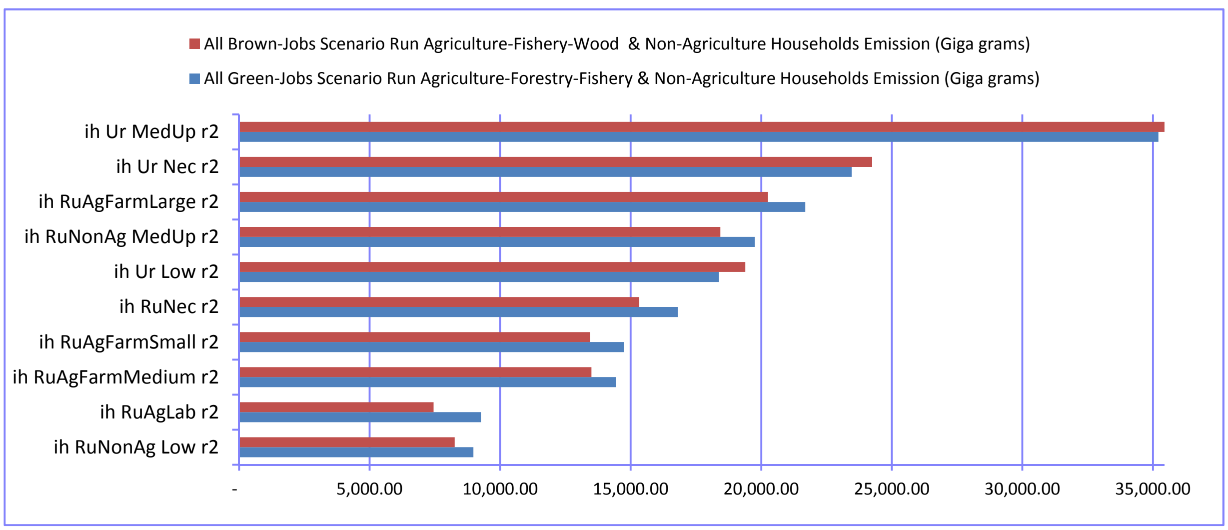
Table 22: Least 15 Polluting Second Scenario Green/Brow-Jobs Activity CO_2 Emissions (Gg grs)

Least Polluting Second Scenario Activity Increase CO_2 Emission Green-Jobs and Brow-Jobs (Giga grams). Ranking Green-Jobs Scenario	Green-Jobs **Second Scenario** Activity CO_2 Emission Increase (Gg. Grs.)	Brown-Jobs **Second Scenario** Activity CO_2 Emission Increase (Gg. Grs.)
Green forest services	3.66	19.55
Brown Forestry Hunt	3.68	13.10
Brown Construction irrigation systems	4.98	43.85
Green Non-timber forest products	8.66	47.70
Green seaweed farming	9.36	48.94
Hotel Affairs	20.06	94.60
Green Sustainable forestry management	23.11	82.18
Green construction rural roads	24.02	30.68
Green building and houses	30.43	172.60
Brown wood (Target)	39.67	190.11
Green sustainable plantation	45.99	2,260.03
BankInsuranceSrv c2	48.80	257.98
Brown Construction non rural and provincial roads	66.38	50.69
Green bamboo and rattan	67.03	355.58
Green sustainable fishery	86.02	449.84

5.4. ALL Green-jobs and Brown-jobs Scenario CO_2 Emission Impacts via Household Consumption

The next graph shows that FSP impacts by households according to the ALL-GJS and All-BJS scenarios.

Figure 5: FSP ALL Green/Brown-Jobs Household CO_2 Emission Impact Increases (Giga grams)



Source see Annex Table 23 worksheet <SceSimCO$_2$MultiSolGraphs>

Figure 5 shows that only for the top two and the fifth emissions out of BJS are larger than under GJS. Further, and in line with expectations, the top four polluters are urban based households and with large and medium size farms while lowest four are all rural based households either working in non-agriculture or agriculture labourers, or owning small and medium size farms. The impacts on CO_2 emission level are such that the lowest four generate pollution levels that are one fourth or less of that of the top two households.

The next three graphs present the impacts of the First and Second scenarios regarding CO_2 household emissions impacts by households. Since, the ranking of growth rates is identical to the CO_2 household emissions reported above the same analysis applies. Note that CO_2 impacts under the Second GJS and Second BJS are very close for all households, but the growth rates are not and the First GJS CO_2 emission impacts dominates (see figure 7).

Figure 6: FSP 1st Green/Brown-Jobs Emission Impact of CO_2 via Household Income (Gg grs)

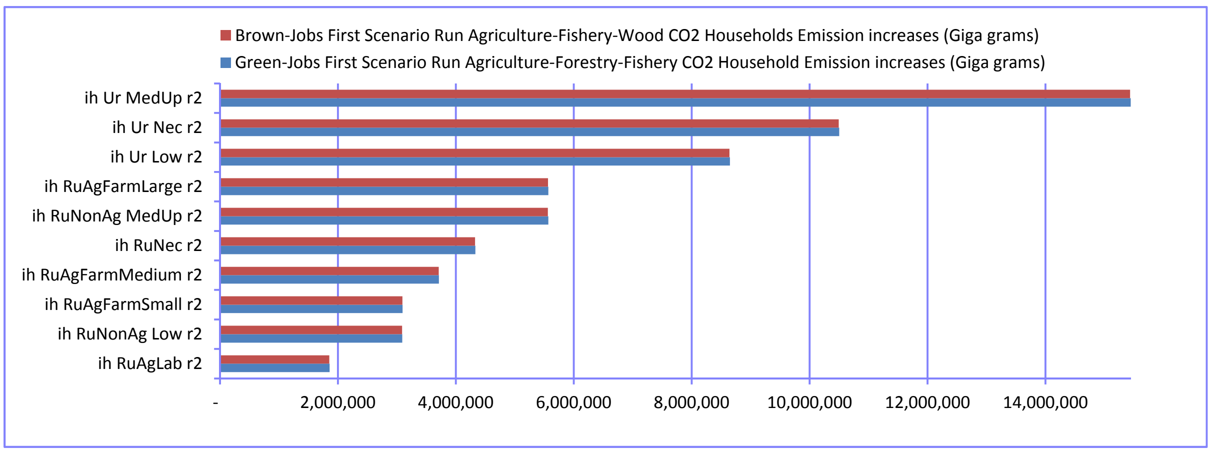
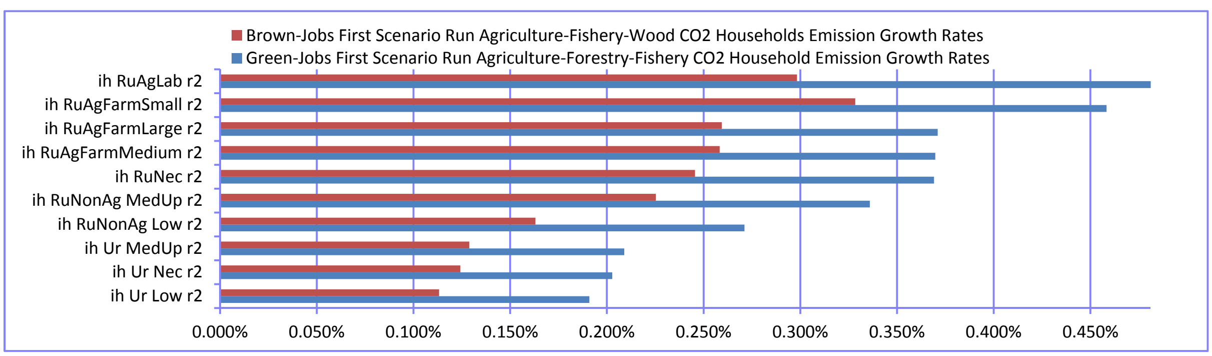
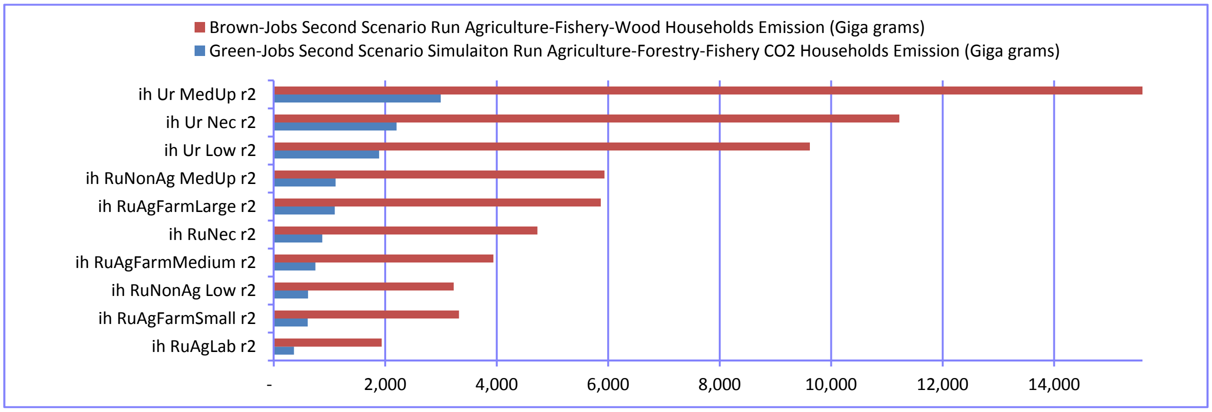


Figure 7: FSP 1st Green/Brown-Jobs Emission Impact of CO_2 via Household Income (Growth rates)



The Second scenario impacts are of course much lower than under the First and now BJS CO_2 emission impacts dominate.

Figure 8: FSP 2nd Green/Brown-Jobs Emission Impact of CO_2 via Household Income (Giga grams)



Summary of findings

- Under BJS pollution is the highest.
- Top 15 polluters under the GJS account for 88% for GJS and 89% for BJS, according to GJS ranking. Top 15 polluters under the BJS account for 96% for BJS and 75% for GJS, according to BJS ranking. Top polluter "Brown electricity gas and water" accounts for 61% under GJS and 59% under BJS
- On the whole, the top 15 do not show direct relation with their target share but reflect strong interaction throughout the economic system (through production and consumption). Nevertheless, they show a rough association with the target levels of sectors in both scenarios.
- Under both scenarios only "Mining Quarry" coincides as third top polluter.
- In the top 15 under the GJS 7 there are green-jobs sectors out of 14, while under the BJS there are 8 brown-jobs sectors out of 13.

6. Main Conclusions and Remarks

Nowadays, most economies attempt to shift to more environmentally friendly technologies, among others, to improve labour conditions, conserve resources and reduce emissions. The GJ-SAM-based analysis, combined with scenario simulation, can provide helpful inputs for policy discussion and decision-making. It can show the inter-linkages and dynamics between environmental, employment and economic objectives. Hence, it is important to identify appropriate quantifiable policy instruments to help policy makers to better understand linkages and transmission mechanisms that take into account environmental degradation and the technology/sectoral implications and their impacts on growth, employment and emissions.

From the analysis of GJ-SAM indicators and two sets of simulations, i.e. one considering only green and brown infrastructure sectors and a second one considering only non-construction green-jobs and brown-jobs sectors, the following conclusions can be drawn:

- Green-jobs technology is a relative concept, thus it must be made country and sector specific.
- Indonesia is just at the beginning, e.g. green accounts for 6 % of total production, 2.5% employment and 2.9% of emissions, while brown accounts for 19 % of production, 27 of employment and around 43.7% of emissions.
- Going-green is a process and progress depends on specific sectors and trade-offs, holds also for employment and CO_2 emissions.
- Transition-to-green needs public policy support to enhance functional and geographical mobility must be taken into account.
- Professional re-orientation, skills development through professional training and education will play a key role in this regard, such as social protection measures.
- Green indicators and scenario analysis show mixed signals for green-jobs.
- Going-green means gradual pollution reduction, not an immediate reduction to zero emission.
- Technological innovation may help reduce pollution faster but trade-offs between going-green and staying brown must be taken into account;
- Going green has the potential in Indonesia to enhance employment with quality jobs and may improve female participation.
- On the average, green-jobs sectors appear to have relatively higher productivity and require higher skills associated with higher income.
- Production emissions account for most CO_2 emissions and household emissions are for the most part induced.
- Several green sectors are significant polluters but most show that they are induced effects.
- It is important to understand the difference between green-jobs and green sector, the former is a labour related definition. A green job has to be green and decent, corresponding to decent work criteria. Green sectors, however, is a technology related definition that do not necessarily converge with green jobs.

The study has shown that moving from brown to green has an interesting potential for the creation of better jobs and therefore has a double impact on sustainable and inclusive development. Nevertheless, the story is not that clear and there are a lot of grey shades, also due to the fact that the move towards a green economy is just at its beginning in Indonesia. This analysis, however, sheds light about how to combine best the environmental objective of a greener economy with economic, employment and CO_2 emission objectives.

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Annex

Figure 9: Green-jobs and Brown-jobs Impacts on Commodities and Activities

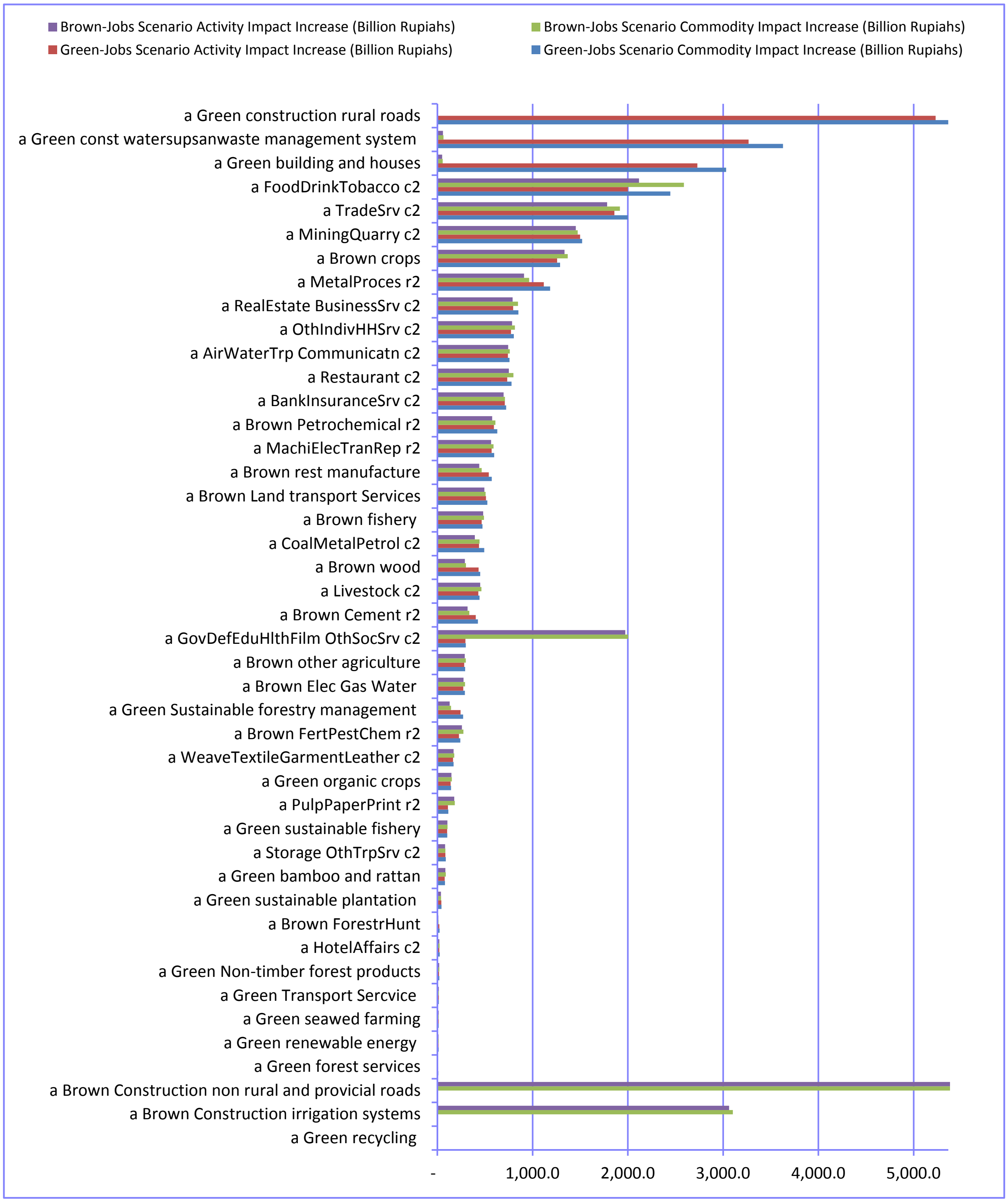

Figure 10: Annual Cost of Creating One Additional Jobs per Sector

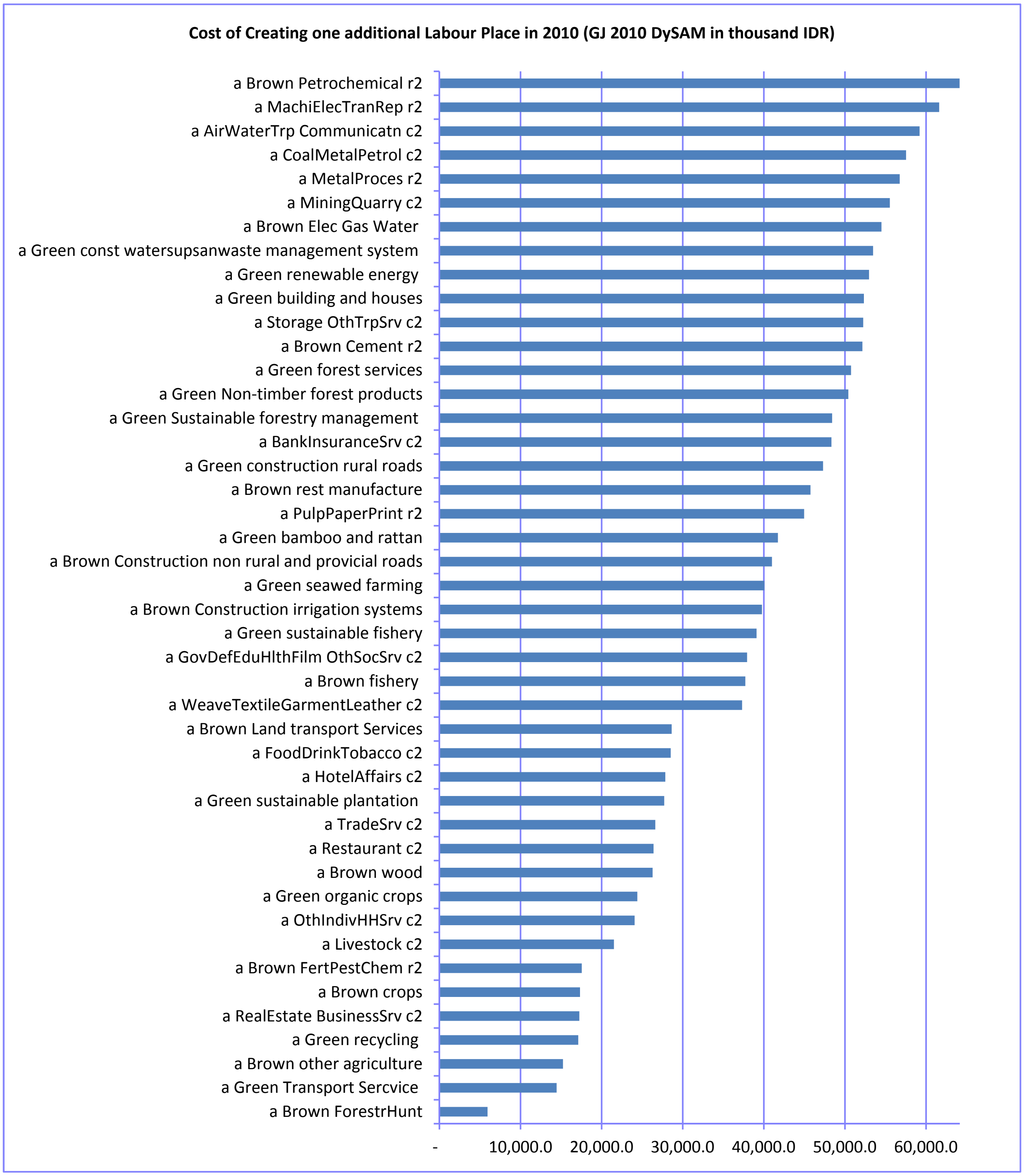

Figure 11: ALL- GJS and ALL-BJS Simulation Run CO2 Activity Increase (Giga grams)

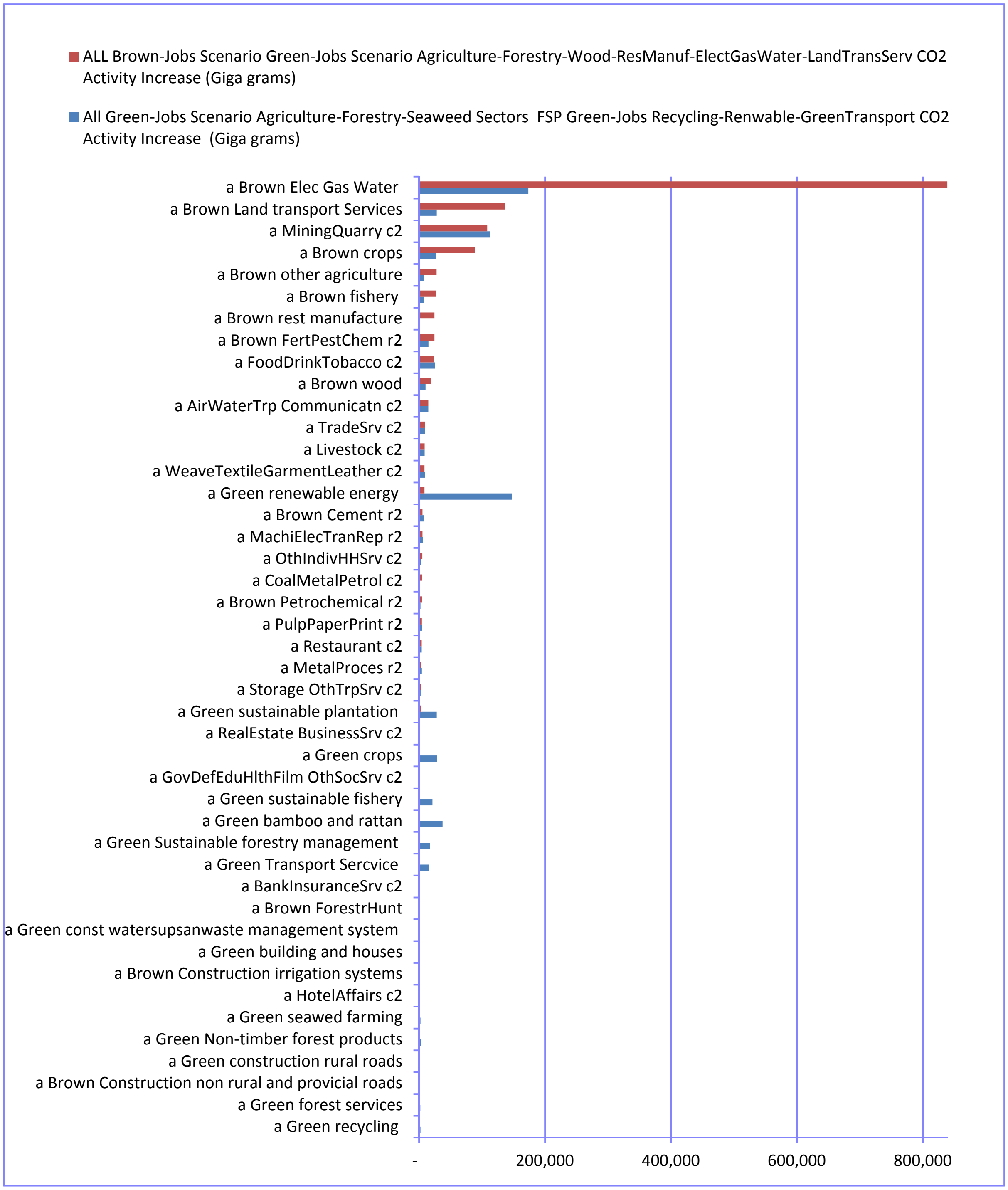

Table 23: Source Excelbook and Worksheets

Source: excel workbook: Indonesia2010GreenJobsDySAM_Emply_CO2SatellitesSimGJ Jan2015

Benchmark SAM 'Social Accounting Matrix Indonesia 2005 with Expanded Construction into Four Activities		Construction Increased Resolution-SISTEM NERACA-'Balance System on Social Economy in Indonesia, 2005 (107X107; in billion Rupiah - "SOSIAL EKONOMI INDONESIA, 2005 (107X107; dalam Rp Miliar)"
No	**List of worksheets Worksheet**	**Description**
1	GreenJobsSchemeReadme	mapping for Extension with green-jobs from 27 to 44 sectors
2	StructureSolDYSAM 2010	Structure of the 44 sector green DySAM. Solution at aggregated macro level: Ma, total backward and forward linkages
3	Adj 44-2010 Green-Jobs DySAM	Adjusted row expansion of 29-44 ColExp 2010 DySAM to keep row and column balance.
4	Adj 44-2010 Green-Jobs DySAMSol	Solution of 2010 GJ DySAM 2010: APS, MA and backward linkages
5	BgkLnkExpGreenModel	Backward linkages for endogenous accounts, correlations, average income and graphs
6	M1OCBgkLnkExpGreenModelGraph	Decomposition solution: M1 and Induced: Backward linkages for endogenous accounts, correlations, average income and graphs
7	SceSimGJ&BJInfraLabMultiGraphs	IFSP (first Scenario) and impacts on economy and jobs creation: tables and graphs
8	SceSimCO2MultiSolGraphs	IFSP (Second Scenario) and impacts on economy and CO2 generation: tables and graphs
9	ScenLeak2010BMa	Solution of 2010 GJ DySAM 2010: B * MA leak multipliers and impacts on exogenous. Calculation of net cost of the FISP
10	EmplSatIGESGJ	The employment satellite for green jobs analysis using the 44-sector green DySAM
11	EmissionSat2010GJ	Emission satellite account for green jobs analysis using the 44-sector green DySAM
12	EmplSatGJYouth2010	Employment satellite with gender and youth employment distinctions for 2010
13		
14	SummLabCo2Sat BkLkgLabMulTabFig	Summary of Labour, CO2 Backward linkages and multipliers: tables and figures
15	SemiSumaScenGJ_BJEmplEmis	Seminar Summary Scenario impacts Gj and BJ on employment and CO2 emissions: tables and figures
16	SeminarFSPScenarioPPT	For PPT Scenario impacts Gj and BJ on employment and CO2 emissions: tables and figures
17	SceActLabCO2	Lab multipliers and Scenario impacts tables

Abstract and Overview

Assessed aspects: Shifts toward environmental technology and impacts on the economy, employment and emissions at macro level.

Description of the methodology: The focus is on deriving potential indicators and the use of scenario analysis to assess policies aiming at the greening of the economy with better quality jobs. The problem of dated SAM is tackled by using the latest SAM extracted from the dynamic SAM algorithm (DySAM). The DySAM generates a series of SAMs, all consistent with the SNA and other time series data.

To derive SAM-based transparent potential indicators and set-up scenarios a GJ-ESAM is built. This requires expanding the SAM with green-jobs technology satellites and to extend it with employment (youth and gender) and CO_2 emission satellite modules. This allows setting-up counter-factual green-jobs vs. brown-jobs scenario simulations to test green-jobs sectors performance *vis-à-vi* brown/hybrid sectors - an important step.

The following potential indicators can be derived:

1- Economy multipliers, total, partial and cross-account linkages;

2- Intra and induced impact multipliers;

3- Employment cumulative impact indicators and direct multipliers;

4- CO_2 emission cumulative impact indicators, partial and cross-account multipliers

Focus of the Analysis: Transition towards green economy has to be well assessed and then supported by appropriate public policies, which may include skills training and re-orientation toward green activities, social protection to counter income loss, and support for labour shifts from brown to green jobs. Then the transition has to be well planned, managed and implemented.

Counter-factual fiscal stimulus package type scenario simulations can help test green-jobs sectors performance vis-à-vi brown-jobs sectors, by providing insight into how to comparatively evaluate policies aimed at shifting towards ecologically friendly technologies. Such simulations can highlight best policy options to attain higher economic, income and employment growth and reduce pollution, by tracing potential instruments, quantifying indicators and scenario impacts.

Main purpose of the Assessment: Nowadays, most economies attempt to shift to more environmentally friendly technologies, among others, to improve labour conditions and reduce emissions. The GJ-SAM-based analysis, combined with scenario simulation, can provide helpful inputs for policy discussion and decision-making. Hence, it is important to identify appropriate quantifiable policy instruments to help policy makers to better understand linkages and transmission mechanisms that take into account environmental degradation and the technology/sectoral implications and their impacts on growth, employment and emissions.

From the analysis of GJ-SAM indicators and two sets of simulations, i.e. one considering only green and brown infrastructure sectors and the another considering only non-construction green and brown sectors, the following conclusions can be drawn:

- Green-jobs technology is a relative concept and must be made specific to a country.

- Indonesia is just beginning, e.g. green accounts for 6 % of production, 2.5% employment and 2.9% of emissions and brown accounts for 19 % of production, 27 of employment and around 40% of emissions.
- Going-green is a process and progress depends on specific sectors and trade-offs, holds for employment and CO_2 emissions.
- Transition-to-green needs public policy support: incentives, skills development and re-orientation, social protection and mobility.
- Green indicators and scenario analysis show mixed signals for green-jobs.
- Going-green means gradual pollution reduction.
- Technological innovation may help reduce pollution faster but trade-offs between going-green and staying brown must be taken into account; it can also enhance employment with quality jobs.
- On the average, green sectors appear to have relatively higher productivity and require higher skills associated with higher income and may improve female participation.
- Production emissions account for most CO_2 emissions and household emission are for the most part induced.
- Several green sectors are significant polluters but most show induced effects.