South Africa's experience in using the 2006 IPCC Software

Presentation at the IPCC Side Event on 2006 IPCC Software
Saturday, 8th June 2013

Presentation Overview

- Background
- Importance of the National Greenhouse Gas inventory in South Africa
- 2006 IPCC Software experience and tools
- Observations and Conclusions

Background

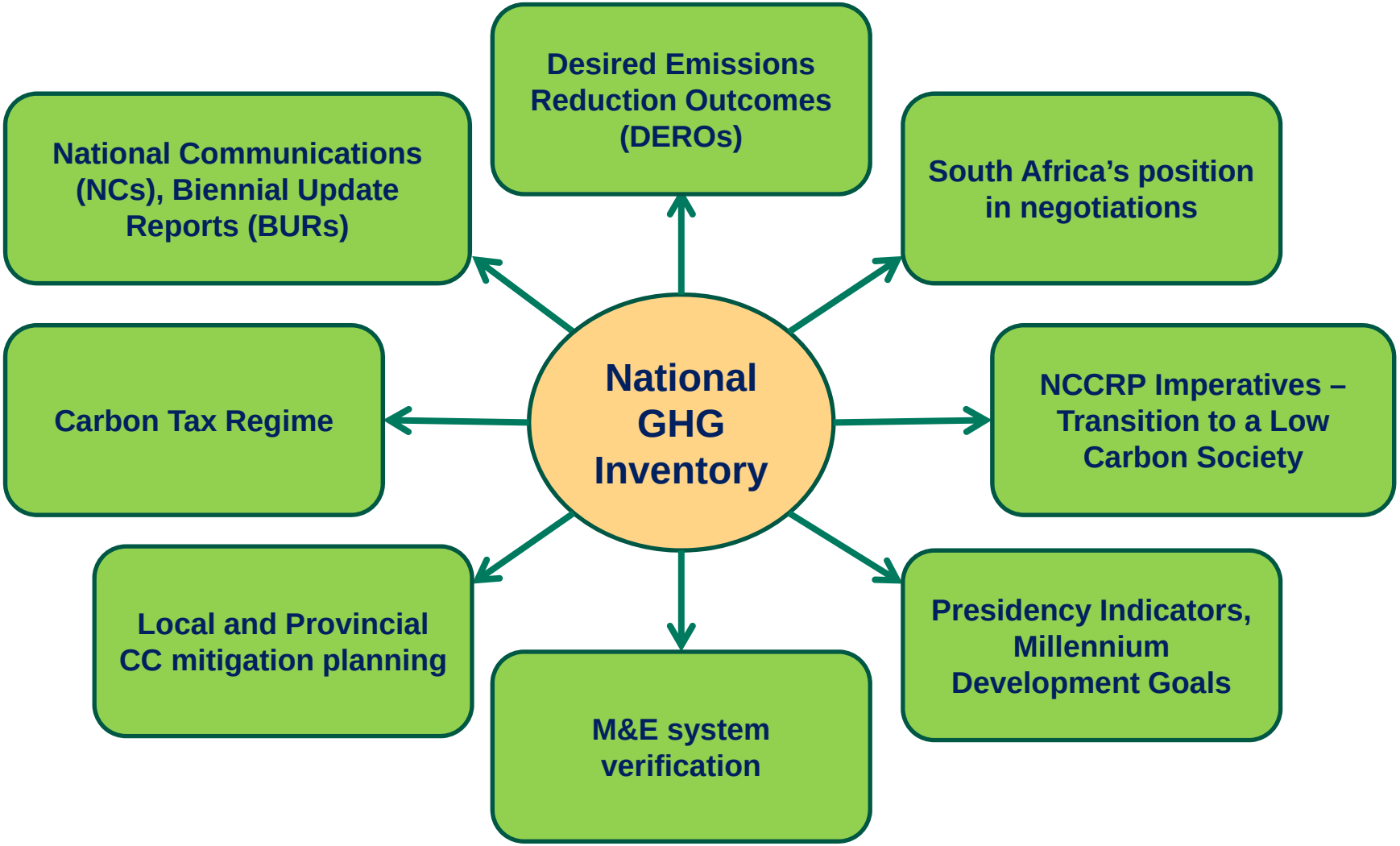
Background

- What does the National Climate Change Response Policy (NCCRP) say about the GHG Inventory:
  - **Executive Summary** (key elements in the overall approach to mitigation) and section 6.1.7 – "Establish a national system of data collection to provide detailed, complete, accurate and up-to-date emissions data in the form of a Greenhouse Gas Inventory and a Monitoring and Evaluation System to support the analysis of the impact of mitigation measures.
  - **Introduction and in relation to international obligations (UNFCCC)** – "Monitor and periodically report to the international community the country's GHG inventory; steps taken and envisaged to implement the UNFCCC; and any other information relevant to the achievement of the objective of the UNFCCC, including information relevant for the calculation of global emission trends"
  - **Section 6.7** – "The DEA in partnership with the South African Weather Service, the host of the SAAQIS, will prepare a GHG Emissions Inventory annually. The inventory will **conform to the IPCC's 2006 or later guidelines**, and will be periodically reviewed by an international team of experts. The inventory will also undertake and report analyses of emissions trends, including detailed reporting on changes in emissions intensity in the economy and a comparison of actual GHG emissions against the benchmark national GHG emission trajectory range described in section 6.4"
  - Section 6.7 – "The emissions inventory will be a web-based GHG Emission Reporting System and will form part of the National Atmospheric Emission Inventory component of the SAAQIS. It will be developed, tested and commissioned within two years of the publication of this policy"

Background

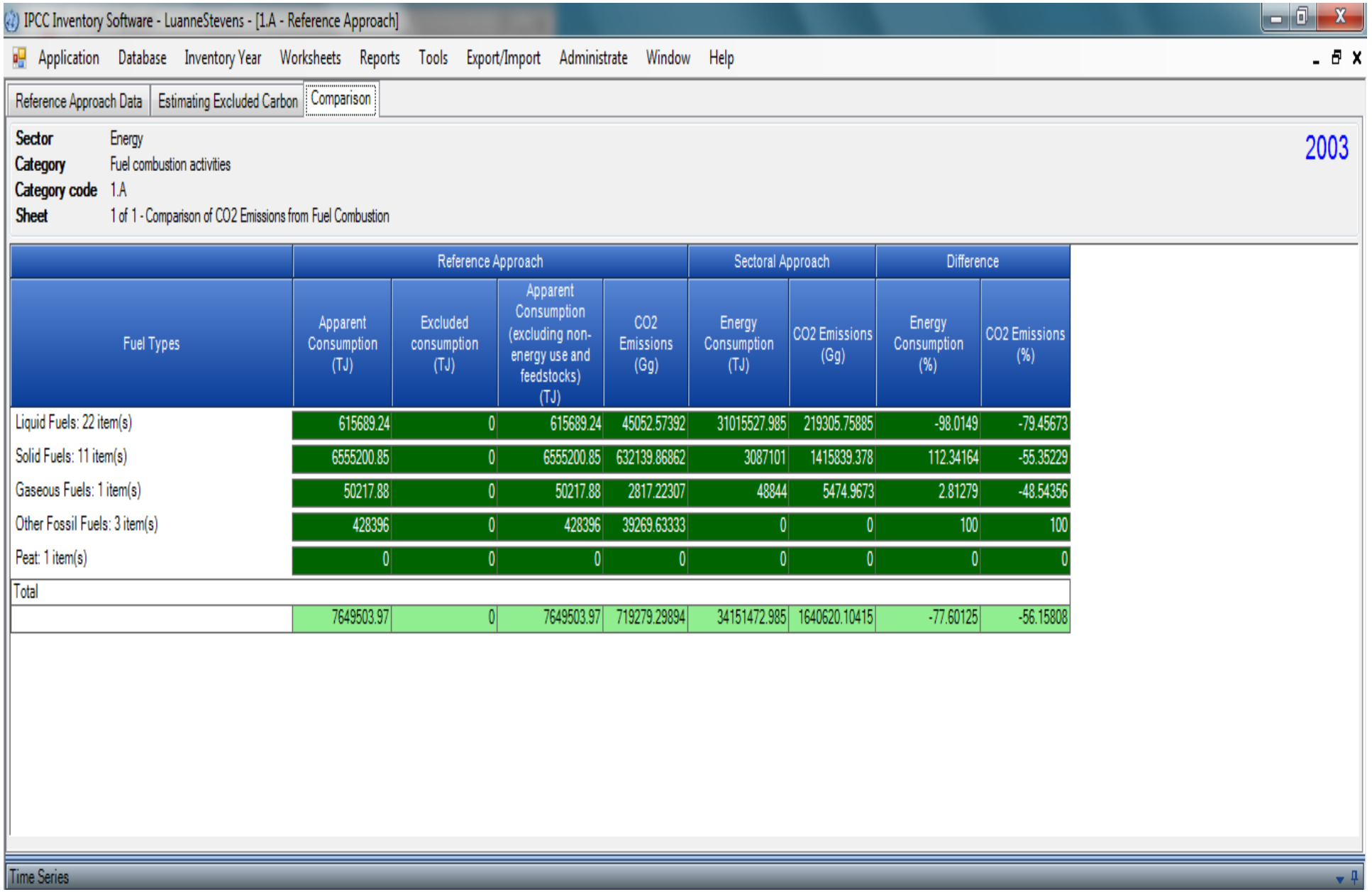
- The 4th GHG inventory is to be completed in June 2013,
- Independent Review process: July- September 2013
- Moving forward, the department wants to sustain the development of all inventories through the development of the South African Air Quality Information System (SAAQIS) Phase II – An Emission Inventory Module
- Inventory fully developed using the 2006 IPCC guidelines,

Importance of a National GHG Inventory



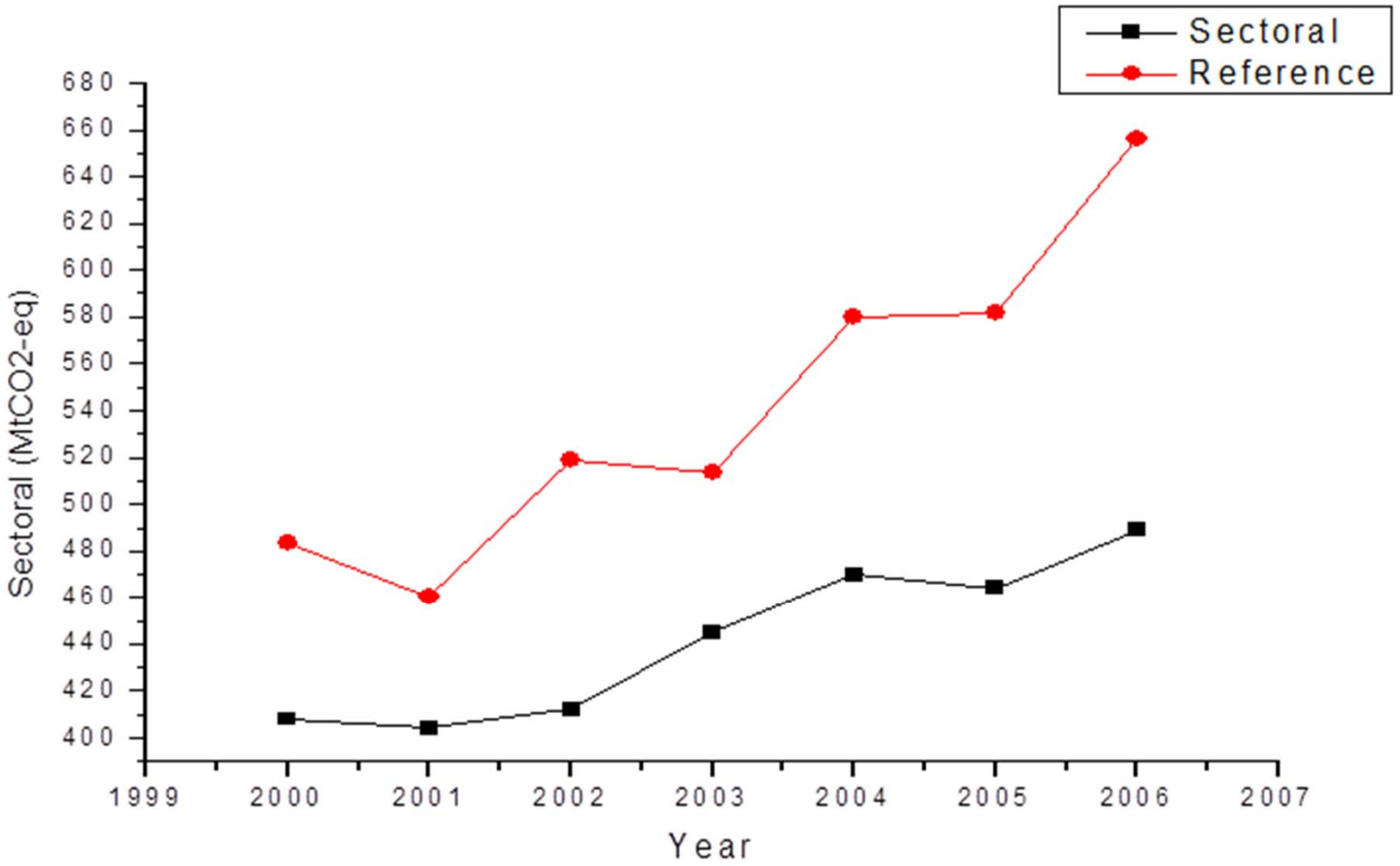
2006 IPCC Software Experiences and Tools

Comparison – Ref vs. Sectoral Approach



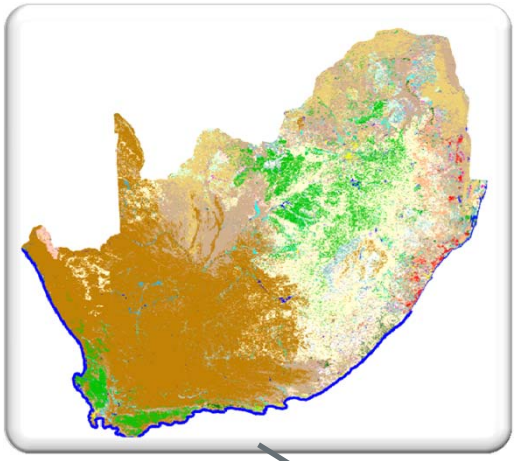
	Reference Approach				Sectoral Approach		Difference	
Fuel Types	Apparent Consumption (TJ)	Excluded consumption (TJ)	Apparent Consumption (excluding non-energy use and feedstocks) (TJ)	CO2 Emissions (Gg)	Energy Consumption (TJ)	CO2 Emissions (Gg)	Energy Consumption (%)	CO2 Emissions (%)
Liquid Fuels: 22 item(s)	615689.24	0	615689.24	45052.57392	31015527.985	219305.75885	-98.0149	-79.45673
Solid Fuels: 11 item(s)	6555200.85	0	6555200.85	632139.86862	3087101	1415839.378	112.34164	-55.35229
Gaseous Fuels: 1 item(s)	50217.88	0	50217.88	2817.22307	48844	5474.9673	2.81279	-48.54356
Other Fossil Fuels: 3 item(s)	428396	0	428396	39269.63333	0	0	100	100
Peat: 1 item(s)	0	0	0	0	0	0	0	0
Total								
	7649503.97	0	7649503.97	719279.29894	34151472.985	1640620.10415	-77.60125	-56.15808

Reference vs. Sectoral approach

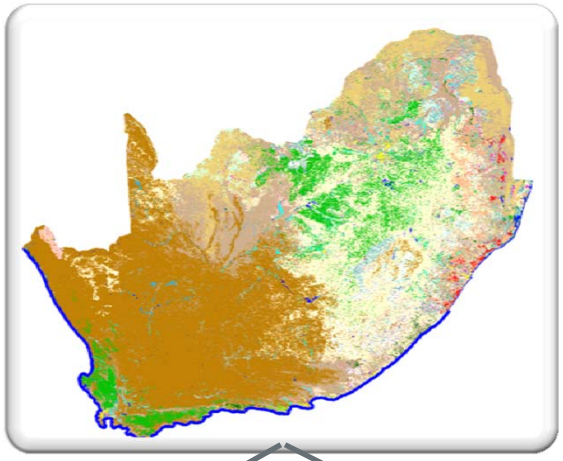


Land Cover Datasets

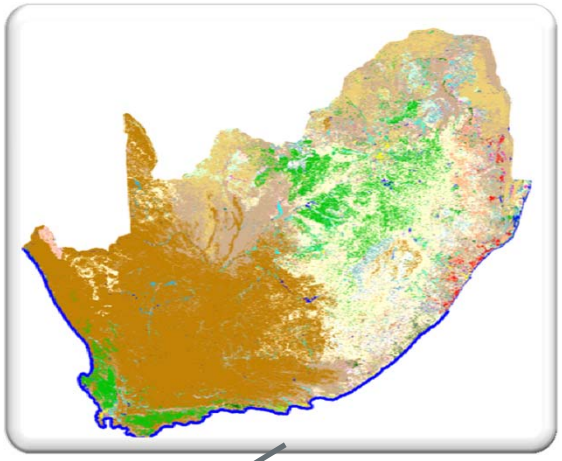
2000 LC Map

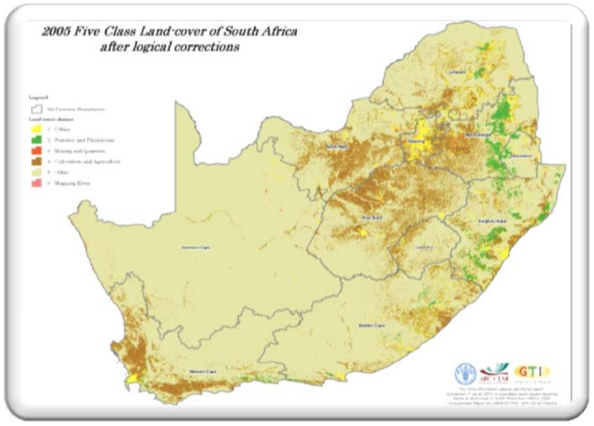


2005 LC Map

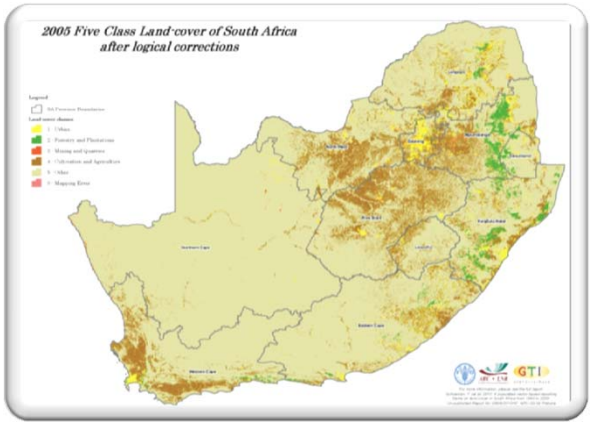


2010 LC Map



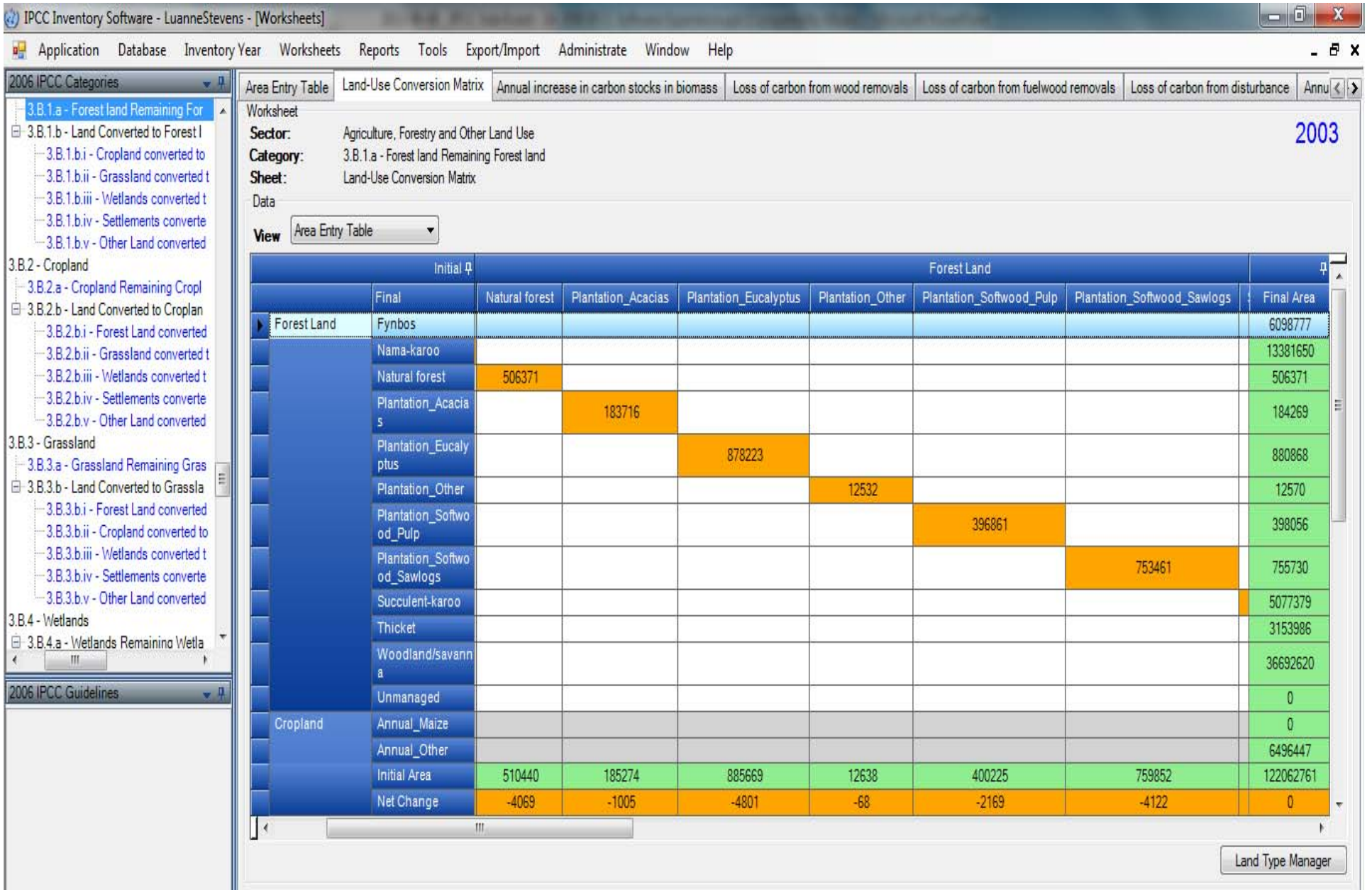


2000-2005 “Change” Map



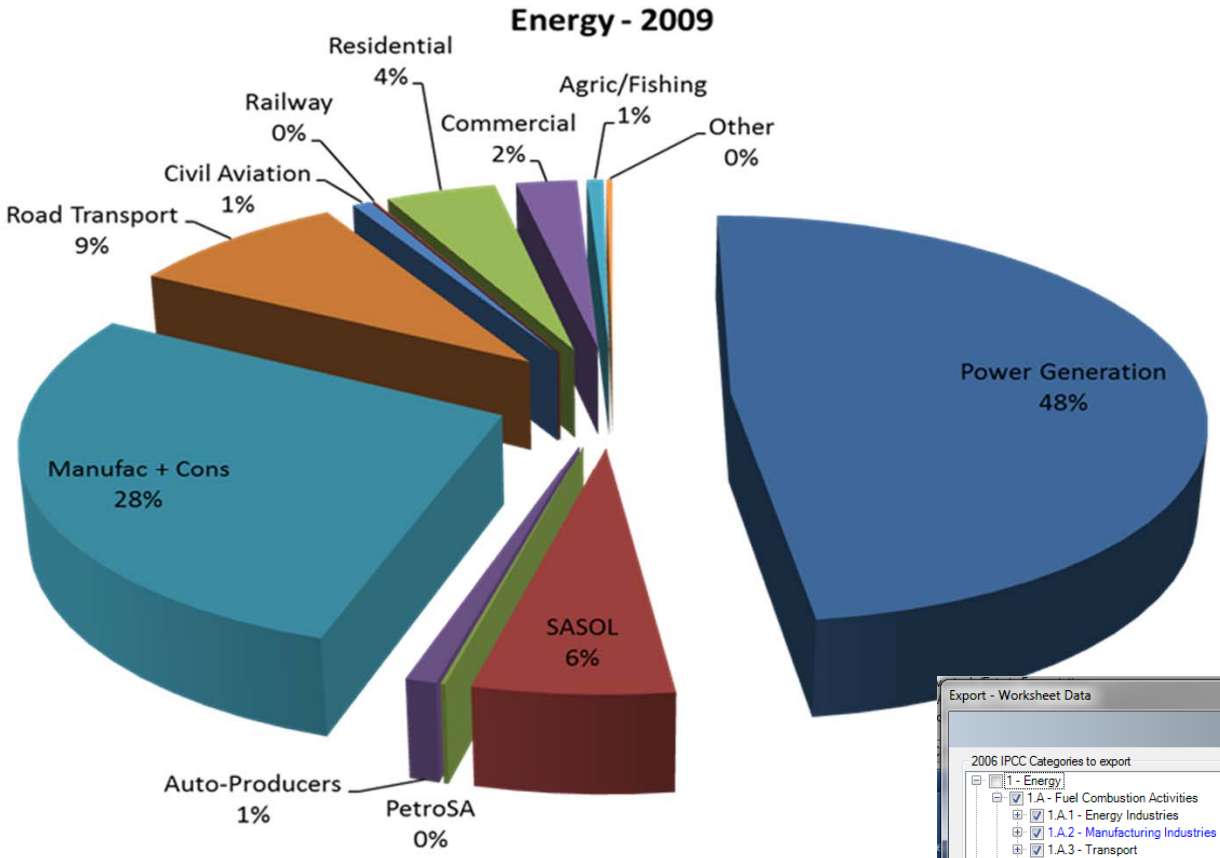
2005-2010 “Change” Map

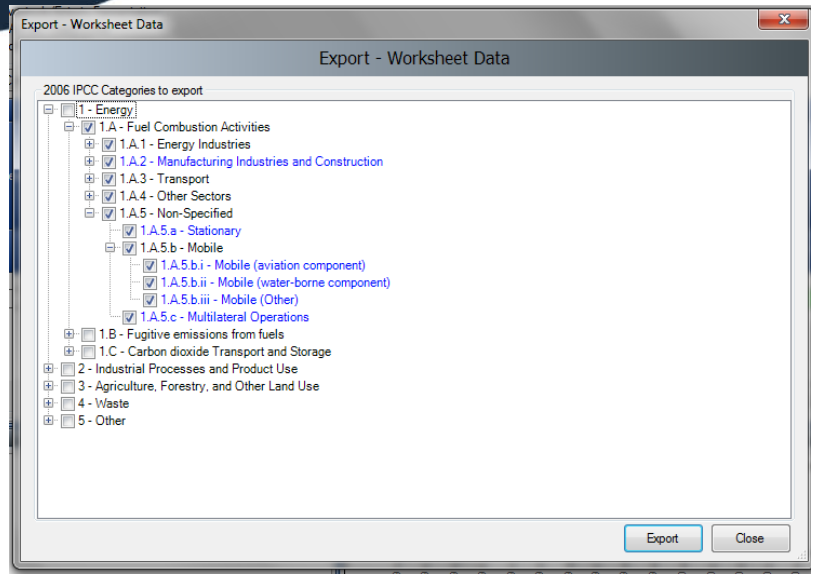
Land use Matrix



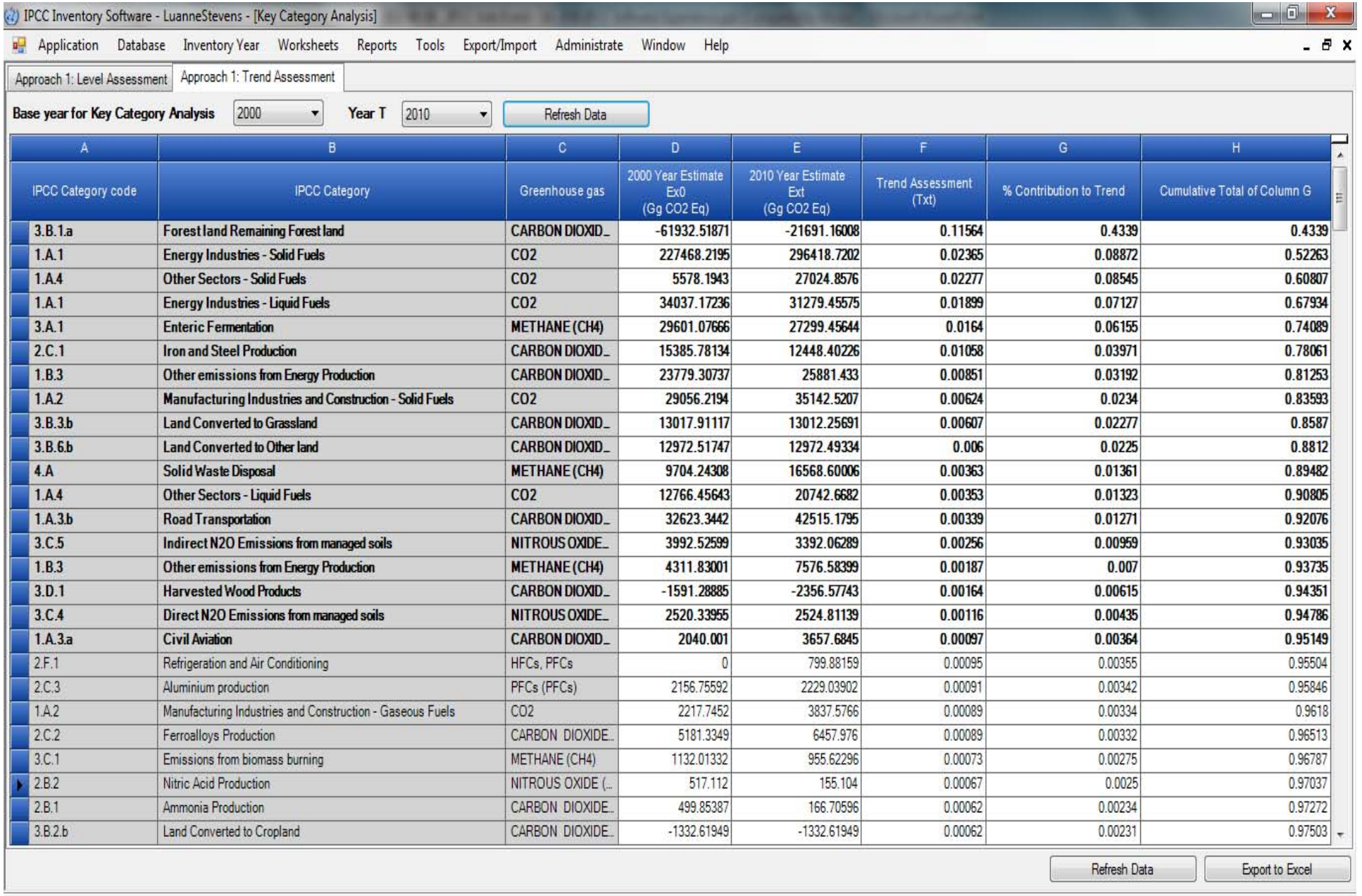
Initial	Final	Natural forest	Plantation_Acacias	Plantation_Eucalyptus	Plantation_Other	Plantation_Softwood_Pulp	Plantation_Softwood_Sawlogs	Final Area
Forest Land	Fynbos							6098777
	Nama-karoo							13381650
	Natural forest	506371						506371
	Plantation_Acacias		183716					184269
	Plantation_Eucalyptus			878223				880868
	Plantation_Other				12532			12570
	Plantation_Softwood_Pulp					396861		398056
	Plantation_Softwood_Sawlogs						753461	755730
	Succulent-karoo							5077379
	Thicket							3153986
	Woodland/savanna							36692620
	Unmanaged							0
Cropland	Annual_Maize							0
	Annual_Other							6496447
	Initial Area	510440	185274	885669	12638	400225	759852	122062761
	Net Change	-4069	-1005	-4801	-68	-2169	-4122	0

Energy Sector – Export – worksheet Data



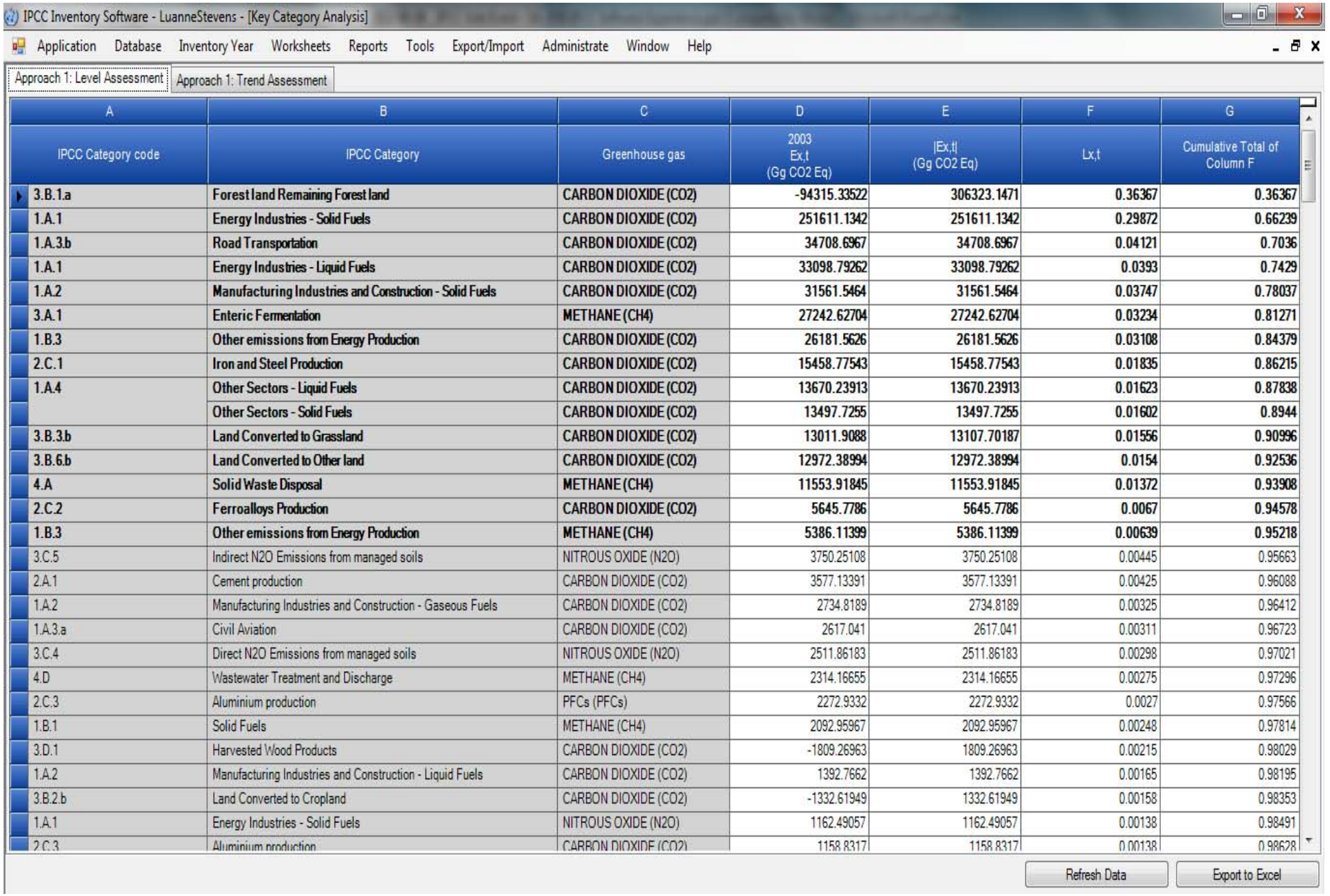


Key Category Analysis - Trend



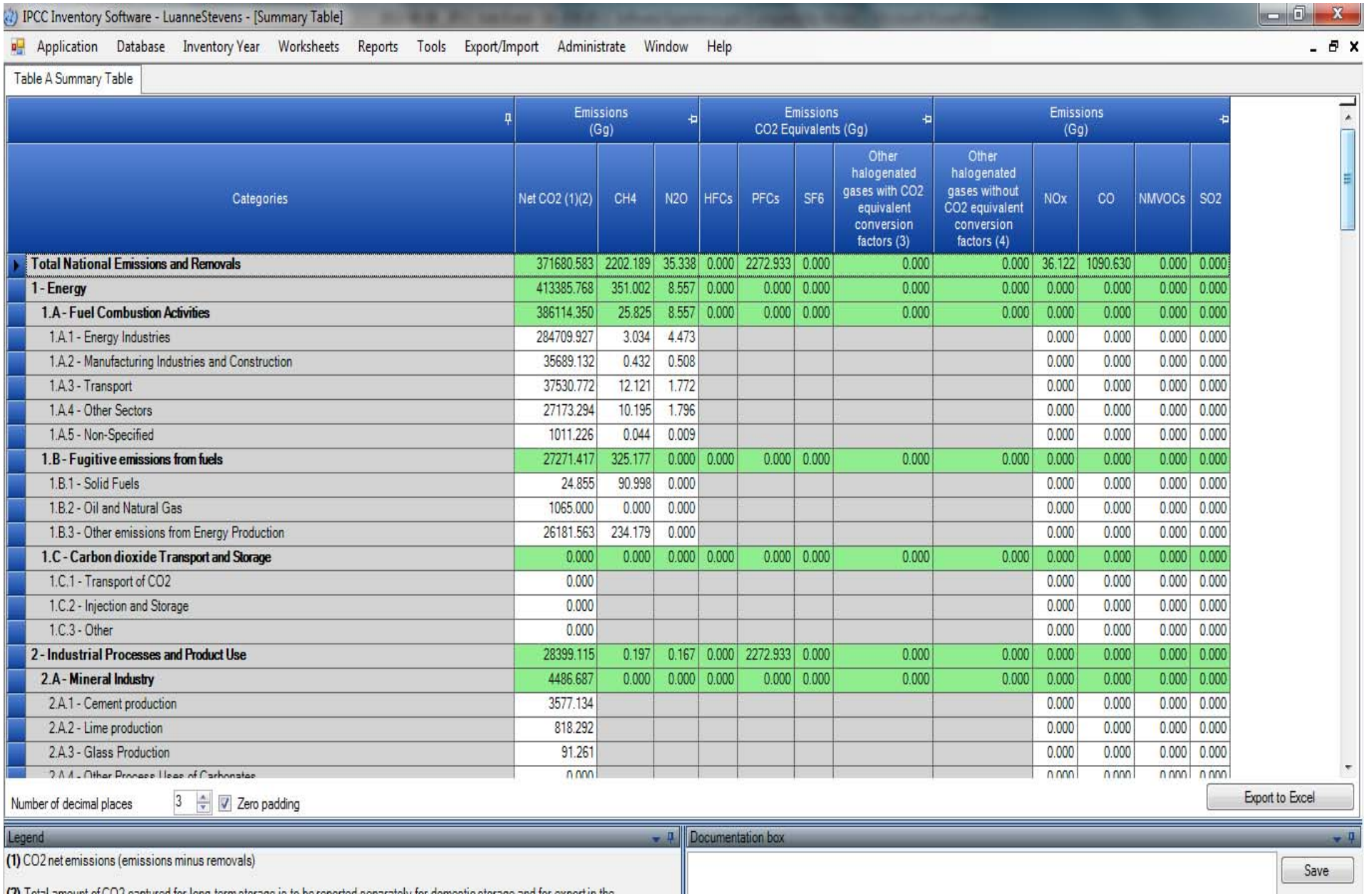
A	B	C	D	E	F	G	H
IPCC Category code	IPCC Category	Greenhouse gas	2000 Year Estimate Ex0 (Gg CO2 Eq)	2010 Year Estimate Ext (Gg CO2 Eq)	Trend Assessment (Txt)	% Contribution to Trend	Cumulative Total of Column G
3.B.1.a	Forest land Remaining Forest land	CARBON DIOXID_	-61932.51871	-21691.16008	0.11564	0.4339	0.4339
1.A.1	Energy Industries - Solid Fuels	CO2	227468.2195	296418.7202	0.02365	0.08872	0.52263
1.A.4	Other Sectors - Solid Fuels	CO2	5578.1943	27024.8576	0.02277	0.08545	0.60807
1.A.1	Energy Industries - Liquid Fuels	CO2	34037.17236	31279.45575	0.01899	0.07127	0.67934
3.A.1	Enteric Fermentation	METHANE (CH4)	29601.07666	27299.45644	0.0164	0.06155	0.74089
2.C.1	Iron and Steel Production	CARBON DIOXID_	15385.78134	12448.40226	0.01058	0.03971	0.78061
1.B.3	Other emissions from Energy Production	CARBON DIOXID_	23779.30737	25881.433	0.00851	0.03192	0.81253
1.A.2	Manufacturing Industries and Construction - Solid Fuels	CO2	29056.2194	35142.5207	0.00624	0.0234	0.83593
3.B.3.b	Land Converted to Grassland	CARBON DIOXID_	13017.91117	13012.25691	0.00607	0.02277	0.8587
3.B.6.b	Land Converted to Other land	CARBON DIOXID_	12972.51747	12972.49334	0.006	0.0225	0.8812
4.A	Solid Waste Disposal	METHANE (CH4)	9704.24308	16568.60006	0.00363	0.01361	0.89482
1.A.4	Other Sectors - Liquid Fuels	CO2	12766.45643	20742.6682	0.00353	0.01323	0.90805
1.A.3.b	Road Transportation	CARBON DIOXID_	32623.3442	42515.1795	0.00339	0.01271	0.92076
3.C.5	Indirect N2O Emissions from managed soils	NITROUS OXIDE_	3992.52599	3392.06289	0.00256	0.00959	0.93035
1.B.3	Other emissions from Energy Production	METHANE (CH4)	4311.83001	7576.58399	0.00187	0.007	0.93735
3.D.1	Harvested Wood Products	CARBON DIOXID_	-1591.28885	-2356.57743	0.00164	0.00615	0.94351
3.C.4	Direct N2O Emissions from managed soils	NITROUS OXIDE_	2520.33955	2524.81139	0.00116	0.00435	0.94786
1.A.3.a	Civil Aviation	CARBON DIOXID_	2040.001	3657.6845	0.00097	0.00364	0.95149
2.F.1	Refrigeration and Air Conditioning	HFCs, PFCs	0	799.88159	0.00095	0.00355	0.95504
2.C.3	Aluminium production	PFCs (PFCs)	2156.75592	2229.03902	0.00091	0.00342	0.95846
1.A.2	Manufacturing Industries and Construction - Gaseous Fuels	CO2	2217.7452	3837.5766	0.00089	0.00334	0.9618
2.C.2	Ferroalloys Production	CARBON DIOXIDE...	5181.3349	6457.976	0.00089	0.00332	0.96513
3.C.1	Emissions from biomass burning	METHANE (CH4)	1132.01332	955.62296	0.00073	0.00275	0.96787
2.B.2	Nitric Acid Production	NITROUS OXIDE (...	517.112	155.104	0.00067	0.0025	0.97037
2.B.1	Ammonia Production	CARBON DIOXIDE...	499.85387	166.70596	0.00062	0.00234	0.97272
3.B.2.b	Land Converted to Cropland	CARBON DIOXIDE...	-1332.61949	-1332.61949	0.00062	0.00231	0.97503

Key Category Analysis - Level

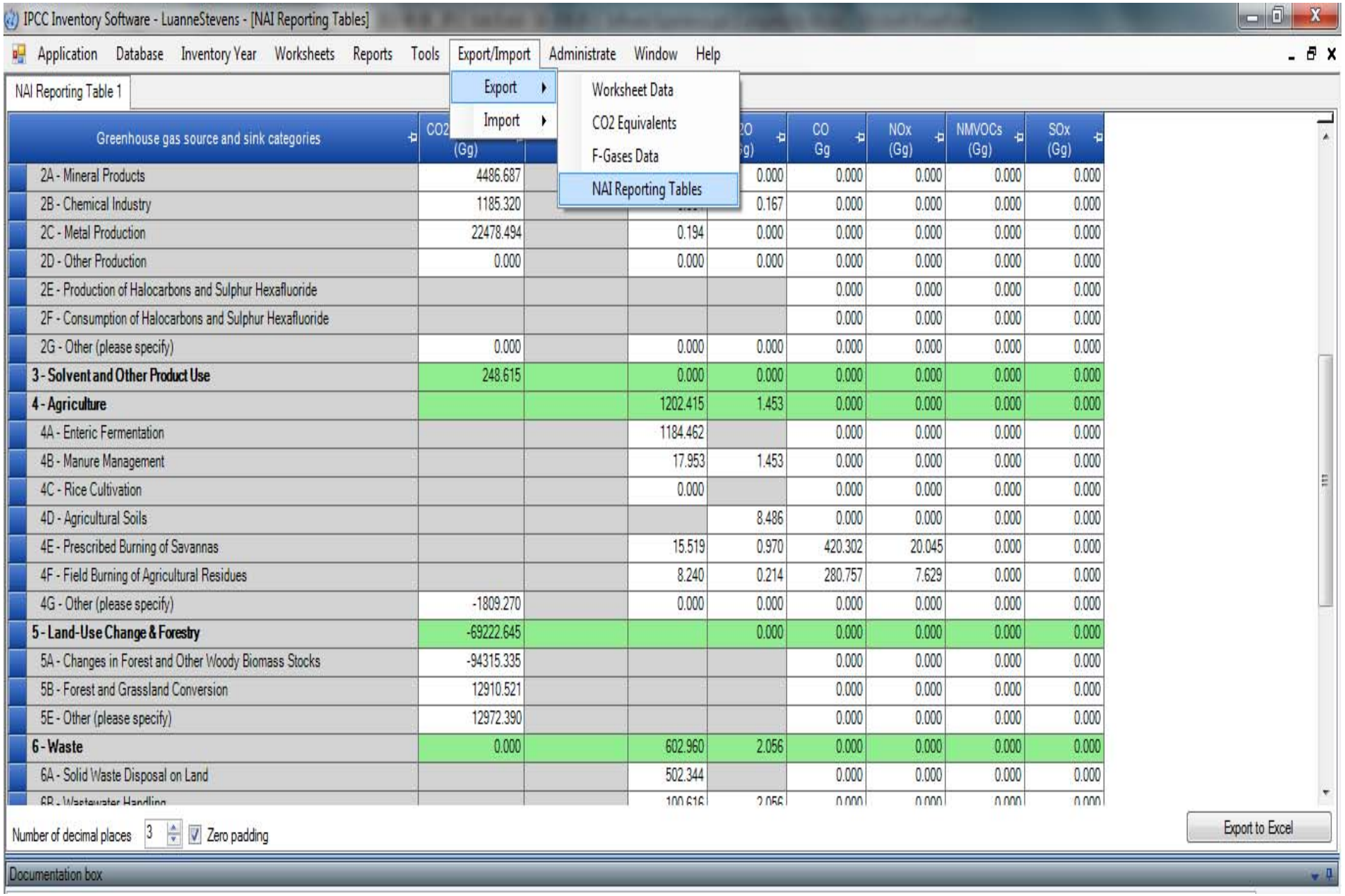


A	B	C	D	E	F	G
IPCC Category code	IPCC Category	Greenhouse gas	2003 Ex,t (Gg CO2 Eq)	|Ex,t| (Gg CO2 Eq)	Lx,t	Cumulative Total of Column F
3.B.1.a	Forest land Remaining Forest land	CARBON DIOXIDE (CO2)	-94315.33522	306323.1471	0.36367	0.36367
1.A.1	Energy Industries - Solid Fuels	CARBON DIOXIDE (CO2)	251611.1342	251611.1342	0.29872	0.66239
1.A.3.b	Road Transportation	CARBON DIOXIDE (CO2)	34708.6967	34708.6967	0.04121	0.7036
1.A.1	Energy Industries - Liquid Fuels	CARBON DIOXIDE (CO2)	33098.79262	33098.79262	0.0393	0.7429
1.A.2	Manufacturing Industries and Construction - Solid Fuels	CARBON DIOXIDE (CO2)	31561.5464	31561.5464	0.03747	0.78037
3.A.1	Enteric Fermentation	METHANE (CH4)	27242.62704	27242.62704	0.03234	0.81271
1.B.3	Other emissions from Energy Production	CARBON DIOXIDE (CO2)	26181.5626	26181.5626	0.03108	0.84379
2.C.1	Iron and Steel Production	CARBON DIOXIDE (CO2)	15458.77543	15458.77543	0.01835	0.86215
1.A.4	Other Sectors - Liquid Fuels	CARBON DIOXIDE (CO2)	13670.23913	13670.23913	0.01623	0.87838
	Other Sectors - Solid Fuels	CARBON DIOXIDE (CO2)	13497.7255	13497.7255	0.01602	0.8944
3.B.3.b	Land Converted to Grassland	CARBON DIOXIDE (CO2)	13011.9088	13107.70187	0.01556	0.90996
3.B.6.b	Land Converted to Other land	CARBON DIOXIDE (CO2)	12972.38994	12972.38994	0.0154	0.92536
4.A	Solid Waste Disposal	METHANE (CH4)	11553.91845	11553.91845	0.01372	0.93908
2.C.2	Ferroalloys Production	CARBON DIOXIDE (CO2)	5645.7786	5645.7786	0.0067	0.94578
1.B.3	Other emissions from Energy Production	METHANE (CH4)	5386.11399	5386.11399	0.00639	0.95218
3.C.5	Indirect N2O Emissions from managed soils	NITROUS OXIDE (N2O)	3750.25108	3750.25108	0.00445	0.95663
2.A.1	Cement production	CARBON DIOXIDE (CO2)	3577.13391	3577.13391	0.00425	0.96088
1.A.2	Manufacturing Industries and Construction - Gaseous Fuels	CARBON DIOXIDE (CO2)	2734.8189	2734.8189	0.00325	0.96412
1.A.3.a	Civil Aviation	CARBON DIOXIDE (CO2)	2617.041	2617.041	0.00311	0.96723
3.C.4	Direct N2O Emissions from managed soils	NITROUS OXIDE (N2O)	2511.86183	2511.86183	0.00298	0.97021
4.D	Wastewater Treatment and Discharge	METHANE (CH4)	2314.16655	2314.16655	0.00275	0.97296
2.C.3	Aluminium production	PFCs (PFCs)	2272.9332	2272.9332	0.0027	0.97566
1.B.1	Solid Fuels	METHANE (CH4)	2092.95967	2092.95967	0.00248	0.97814
3.D.1	Harvested Wood Products	CARBON DIOXIDE (CO2)	-1809.26963	1809.26963	0.00215	0.98029
1.A.2	Manufacturing Industries and Construction - Liquid Fuels	CARBON DIOXIDE (CO2)	1392.7662	1392.7662	0.00165	0.98195
3.B.2.b	Land Converted to Cropland	CARBON DIOXIDE (CO2)	-1332.61949	1332.61949	0.00158	0.98353
1.A.1	Energy Industries - Solid Fuels	NITROUS OXIDE (N2O)	1162.49057	1162.49057	0.00138	0.98491
2.C.3	Aluminium production	CARBON DIOXIDE (CO2)	1158.8317	1158.8317	0.00138	0.98628

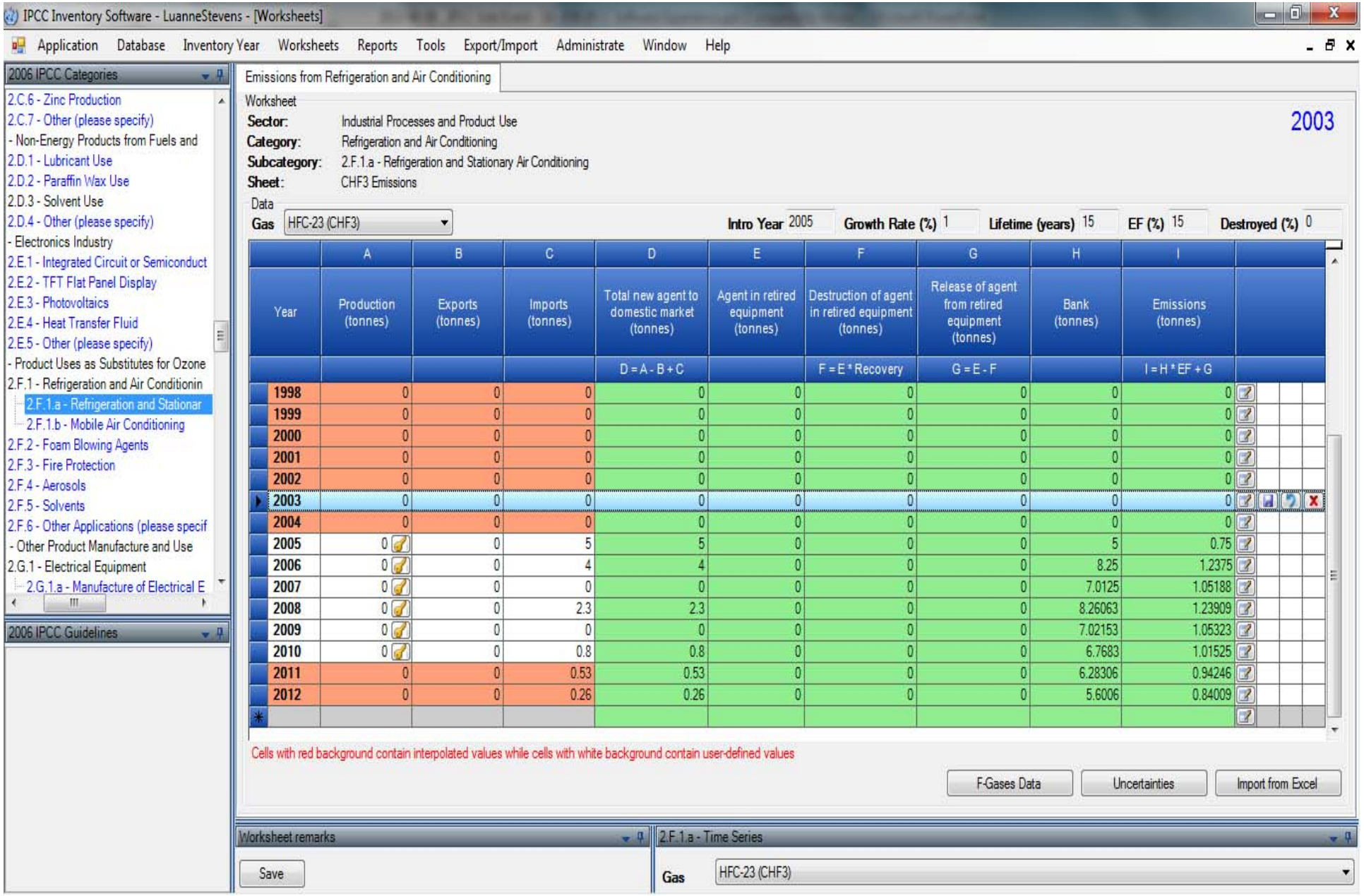
Reporting: 2006 GLs



Reporting: 1996 GLs + 2000 GPG



F-Gases


IPCC Inventory Software - LuanneStevens - [Worksheets]
Application Database Inventory Year Worksheets Reports Tools Export/Import Administrate Window Help
2006 IPCC Categories
2.C.6 - Zinc Production
2.C.7 - Other (please specify)
- Non-Energy Products from Fuels and
2.D.1 - Lubricant Use
2.D.2 - Paraffin Wax Use
2.D.3 - Solvent Use
2.D.4 - Other (please specify)
- Electronics Industry
2.E.1 - Integrated Circuit or Semiconduct
2.E.2 - TFT Flat Panel Display
2.E.3 - Photovoltaics
2.E.4 - Heat Transfer Fluid
2.E.5 - Other (please specify)
- Product Uses as Substitutes for Ozone
2.F.1 - Refrigeration and Air Conditionin
2.F.1.a - Refrigeration and Stationar
2.F.1.b - Mobile Air Conditioning
2.F.2 - Foam Blowing Agents
2.F.3 - Fire Protection
2.F.4 - Aerosols
2.F.5 - Solvents
2.F.6 - Other Applications (please specif
- Other Product Manufacture and Use
2.G.1 - Electrical Equipment
2.G.1.a - Manufacture of Electrical E
2006 IPCC Guidelines
Emissions from Refrigeration and Air Conditioning
Worksheet
Sector: Industrial Processes and Product Use
Category: Refrigeration and Air Conditioning
Subcategory: 2.F.1.a - Refrigeration and Stationary Air Conditioning
Sheet: CHF3 Emissions
2003
Data
Gas HFC-23 (CHF3)
Intro Year 2005
Growth Rate (%) 1
Lifetime (years) 15
EF (%) 15
Destroyed (%) 0
A B C D E F G H I
Year
Production (tonnes)
Exports (tonnes)
Imports (tonnes)
Total new agent to domestic market (tonnes)
Agent in retired equipment (tonnes)
Destruction of agent in retired equipment (tonnes)
Release of agent from retired equipment (tonnes)
Bank (tonnes)
Emissions (tonnes)
D = A - B + C
F = E * Recovery
G = E - F
I = H * EF + G
1998 0 0 0 0 0 0 0 0 0
1999 0 0 0 0 0 0 0 0 0
2000 0 0 0 0 0 0 0 0 0
2001 0 0 0 0 0 0 0 0 0
2002 0 0 0 0 0 0 0 0 0
2003 0 0 0 0 0 0 0 0 0
2004 0 0 0 0 0 0 0 0 0
2005 0 0 5 5 0 0 0 5 0.75
2006 0 0 4 4 0 0 0 8.25 1.2375
2007 0 0 0 0 0 0 0 7.0125 1.05188
2008 0 0 2.3 2.3 0 0 0 8.26063 1.23909
2009 0 0 0 0 0 0 0 7.02153 1.05323
2010 0 0 0.8 0.8 0 0 0 6.7683 1.01525
2011 0 0 0.53 0.53 0 0 0 6.28306 0.94246
2012 0 0 0.26 0.26 0 0 0 5.6006 0.84009
Cells with red background contain interpolated values while cells with white background contain user-defined values
F-Gases Data
Uncertainties
Import from Excel
Worksheet remarks
Save
2.F.1.a - Time Series
Gas HFC-23 (CHF3)

Observations and conclusions

- Built-in analysis tools makes it easy to interrogate input data
- Land-use manager helps inventory compilers to critique land use change data and identify inconsistencies
- Software database easy to manage and to facilitate a review process
- Software is able to meet any reporting requirements
- In some cases, the software makes it easy to input data compared to IPCC spreadsheet models (e.g. F-gases and Waste)

Thank You

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