



# EX-Ante Carbon-balance Value Chain (VC) Tool v.1.1

EX-ACT team, ESA, September 2016

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## EX-ACT VC : providing co-benefits appraisal of Value Chain on GHGs emissions, climate resilience and income

### Background

Today, food value chain count for 19-29% of GHG emissions (Vermeulen et al, 2012) in the world and 1/3 of the total food produced is lost and wasted, which represents a cost of 750 billion US\$ (FAO, 2013). Current agricultural systems, processing and transportation restrict sustainable development in the food sector.

Moreover, 3/4 of the world's poor population live in rural areas, where agriculture contributes to 80% of revenue and is four time more effective at increasing GDP and at reducing poverty as compared to other sectors (WB, 2007). In this context, small farmers are especially vulnerable to the effects of climate change. If these effects are highly visible on agricultural production, they also impact the rural infrastructure, market access and the productivity of the different sectors present in the value chain (VC).

Changes have to be made and food value chain presents numerous challenges and opportunities to tackle simultaneously the multiples stakes faced by rural population, in order to **eradicate poverty, increase resilience of the population and the ecosystems and to decarbonize our global economy.**

Improving VC must be economically, environmentally and socially sustainable, thus playing an important role in terms of mitigation, adaptation and socio-economic performances, offering important pathways out of poverty for millions of poor households in developing countries.

Analysing food value chain can help identifying strategic options for improving their resilience while generating co-benefits at every stage of the chain.

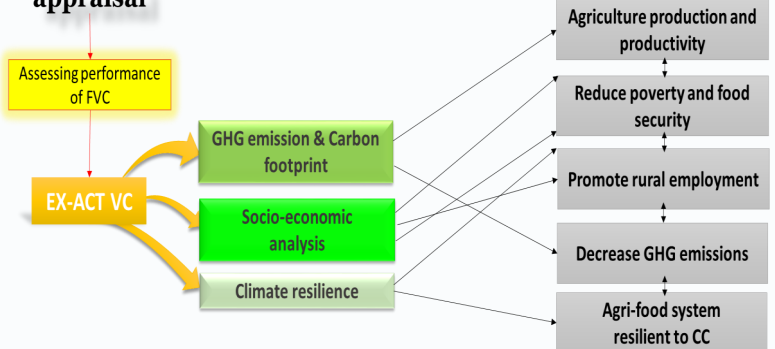
**Value chain upgrading can play an important role in terms of climate change resilience, poverty reduction and food security.**

### Objectives of the tool :

The EX-ACT Value Chain tool is a tool derived from EX-ACT and retargeted for simple value chain. It aims at proving multi-impact appraisal either for the current situation of the value chain or for an upgrading project scenario.

### Output of the EX-ACT VC tool

#### Multi impact appraisal



Estimations of **GHG emissions** (in tCO<sub>2</sub>-e), **climate resilience** and **socio-economic performances** such as **income**

generated are analyzed for both situation in order to assess adaptation and mitigation options on every stage of the VC from production to retailers.

### Basic contents of EX-ACT VC and main outputs

EX-ACT VC has been developed based on the Guidelines for NNGI-IPCC completed with other existing methodologies. The default values for mitigation options in the agriculture sector are mostly from IPCC (2006). Other coefficient factors have been collected from Lal (2004), Berners-Lee et al (2012), Weber and Mathews (2008) and Lukse (2010), for the other stage.

EX-ACT VC consists of a set of 8 linked Microsoft Excel sheets in which users insert basic data on agricultural management practices, processing, transportation, prices and work forces.

EX-ACT VC adopts a **modular approach** – each “module” describes a specific level of the VC – and following a VC framework :

1. A general description of the current situation of the VC and, if any, a description of the upgrading project;
2. Identification of changes and technologies foreseen in the VC upgrading using specific “modules” (*Land use change – forest, non-forest, Agricultural practices – annual/perennial crop, rice cultivation, irrigated systems, Production inputs, Processing and Transportation inputs*);
3. Economic analysis using previous data for every level of the VC;
4. For an upgrading project scenario, a qualitative identification for climate resilience analysis.

The main output of the tool consists of the carbon-balance and carbon footprint of the VC, climate resilience dimension, resilience index of the upgraded VC and socio-economic analysis (value added and gross income per ton of product for beneficiaries).

**Value chain upgrading does require to cover several co-benefit linking with GHGs, climate resilience and poverty reduction**

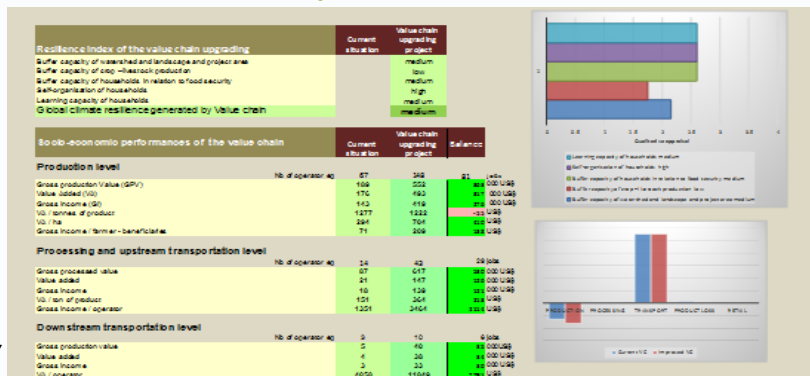
### Carbon footprint and climate change mitigation :

Those indicators allow to identify the main source of GHGs emission, and the best option to reduce the carbon footprint. The environmental services (Carbon) supplied by the VC is estimated through the Carbon footprint, then priced, valued and incorporated into the economic analysis of projects, examining how the discounted measures of the VC worth when taking into account C sequestration benefits, thus assessing the climate change mitigation.

### Socio economic analysis

Few action plans are possible at processing and transportation level for reducing GHG together with reduction of production loss. Nevertheless the economic analysis illustrates how important those sectors are in term of added value, gross income or employment, and the upgraded scenario offers to analyse its potential on poverty reduction. Therefore it allows to raise different possible options to upgrade the VC. This tool could possibly promote carbon labels on all or part of the VC and implement payment for environmental services. Also, a set of indicators complements the economic analysis, providing useful information about the efficiency of the project at providing environmental services or the potential contribution of such services to farm incomes.

### Structure of the EX-ACT VC tool results



### #Case study : Developing fermented cocoa in Haiti

Cocoa value chain encounters numerous problem in terms of productivity in Haiti at the different stage of the chain. Implementing improved agroforestry plantation and upgrading cocoa processing allow farmers to create better quality cocoa and reach more valuable market. This seems to be new a source of income, while generating environmental co-benefits. The current situation of the cocoa value chain is compared to this upgrading scenario and gives incremental indicators concerning socio-economic and environmental performances.

### The way forward

	Current situation	Upgrading scenario	Balance
<b>GHGs emissions (tCO<sub>2</sub>-e/yr)</b>	-391	-943	- 552
<b>Carbon Footprint (tCO<sub>2</sub>-e/ton of cocoa)</b>	8.7	7.8	- 0.8
<b>Gross income/ farmers (US\$)</b>	71	209	+ 138
<b>Total Value Added (US\$)</b>	202,000	678,000	+ 476,000

This tool is only adapted for crop-based value chain. Very soon new tools/modules will be added for livestock and fisheries value chains.

Further information (guidelines, case studies) on the EX-ACT website: <http://www.fao.org/tc/exact/user-guidelines/ex-ante-carbon-balance-tool-for-value-chain/en/>

The main output of the tool consists of a multi-impact appraisal of the Value Chain