

# Impact Evaluation Framework Tool

Release V. 1.0

The IEF Tool is developed by Politecnico di Milano, Department of Energy  
UNESCO Chair in Energy for Sustainable Development

## DISCLAIMER

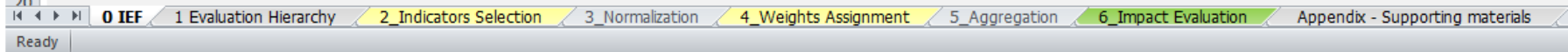
The use of this tool is intended for internal use only, under the framework of the Set4food project



- This excel worksheet is made by several sheets.
- **yellow** sheets require data input by the user
  - **grey** sheets give instruction or show performed calculations
  - **green** sheet presents final results

**Remember that different sheets (and instructions) are identified by different colors**

**Sheet nr. 0: presentation of the tool**



**General Instructions**

**TO READ:**

- 1) The Evaluation Hierarchy represents the skeleton of the Impact Evaluation Framework (IEF), namely a multi-dimensional, people-oriented and context-specific structure.
- 2) IEF allows to evaluate the long-term project impact as changes (positive or negative) of the five target community's Capitals: Natural, Physical, Human, Social and Financial (TABLE 1).
- 3) Capitals are broken down in their main Dimensions, which represent the second level the hierarchy (FIGURE 1). Dimensions are intended as "sub-capitals", i.e. those topics and themes relevant for each Capital to be monitored for a complete impact evaluation since they cover both tangible and intangible aspects.
- 4) Capitals and Dimensions represent only the first two levels of the hierarchy: an appropriate set of indicators within each dimension should be defined through a participatory process, accordingly to the relevant context factors, available data and projects features (see next Section). However, based on an extensive literature and case study review, some particularly relevant indicators (Alerts) are given as mandatory for every project. Alerts are **marked red** among examples in TABLE 1. Refer to the **supporting material sheet** to better understand how indicators are defined and should be measured.
- 5) In these terms, while the Evaluation Hierarchy is designed as a top-down approach, its customization follows a bottom-up path, since users can partially adapt the general structure to their own case in a participatory way by defining project-specific indicators to be monitored and mandatory Alerts.

**Read the general instruction:  
the Evaluation Hierarchy, which represents the skeleton of the  
Impact Evaluation Framework (IEF) is presented**

TABLE 1 - Capital & Dimension Hierarchy		FIGURE 1 - The Evaluation Hierarchy	
<b>Capitals &amp; Dimensions</b>			
<b>Natural Capital</b>	Natural Cap assets and fuels, etc.) the fundamental the people evaluation and locally,	<ul style="list-style-type: none"> <li>Indicator 1</li> <li>Indicator 2</li> <li>Indicator 3</li> </ul>	
	<b>Land</b>		Land
	<b>Water</b>		Water
	<b>Air</b>	Air	<ul style="list-style-type: none"> <li>Heavy Infrastructures</li> <li>Light Infrastructures</li> <li>Smart Infrastructures</li> </ul>
<b>Dimensions</b>	<b>Land</b>	<ul style="list-style-type: none"> <li>Education &amp; Competences</li> <li>Capabilities</li> <li>Health Status</li> </ul>	
	<b>Water</b>	<ul style="list-style-type: none"> <li>Collaboration &amp; Initiatives</li> <li>Equity &amp; Inclusiveness</li> </ul>	
	<b>Air</b>	<ul style="list-style-type: none"> <li>Economic Status</li> <li>Formal Economy</li> <li>Informal Economy</li> </ul>	

**Sheet nr. 1: presentation of the  
Evaluation Hierarchy**

## General Instructions

## TO READ:

- 1) The Evaluation Hierarchy represents the skeleton of the Impact Evaluation Framework (IEF), namely a multi-dimensional, people-oriented and context-specific structure.
- 2) IEF is based on the five target community's Capitals: Natural, Physical, Human, Social and Financial (TABLE 1).
- 3) Capital dimensions are defined in the hierarchy (FIGURE 1). Dimensions are intended as "sub-capitals", i.e. those topics and themes relevant for each Capital to be monitored.
- 4) Capital dimensions are defined by an appropriate set of indicators within each dimension. This is done by selecting an extensive literature and case studies.
- 5) In these terms, while the IEF hierarchy is designed with a top-down approach, its customization follows a bottom-up approach. Specific indicators to be added to mandatory Alerts are defined by the participatory way by defining specific indicators to be added to mandatory Alerts.

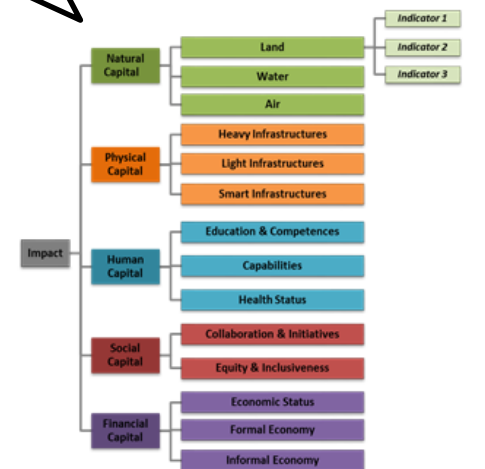
Capitals and dimensions are described

Scheme of the Evaluation Hierarchy

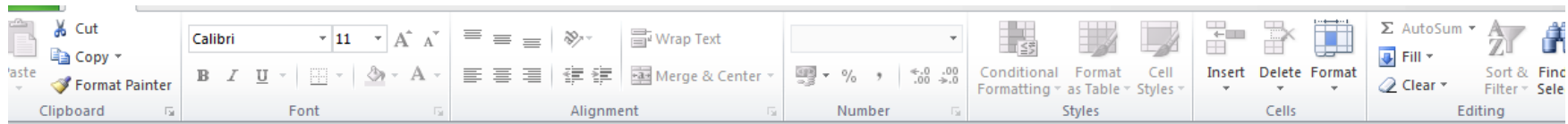
TABLE 1 - Content of the Evaluation Hierarchy

Capitals & Dimensions		Description
<b>Natural Capital</b>		Natural Capital (NC) includes the availability and the quality of environmental resources from which a community derives assets and services useful in terms of livelihoods, from divisible assets used directly for production (lands, wood, fossil fuels, etc.) to intangible public goods such as the air and the ecosystem. Particularly in rural contexts, Natural Capital is fundamental since most of the activities are based on natural resources (e.g. fishing, farming, livestock holdings, etc.) and the people health and well-being is also functional to the complex natural ecosystem. Indeed, including NC in the impact evaluation is relevant in order to assess the amount of pressure that the project have had on the environment, both globally and locally, on five main selected dimensions: <i>Land, Water, Air, Ecosystem &amp; Biodiversity and Raw Materials</i> .
Dimensions	<b>Land</b>	This dimension evaluates changes of the land quality and availability entailed by the project. Land is more than just a physical space: it is an important natural resource essential for growing food and for working, especially in rural areas where most of the activities are land-related (agriculture and cattle rising). The implementation of energy projects may cause land degradation and acidification, which damage the quality of water and food, and undermine the agriculture productivity and the forest areas. <i>Possible indicators within this Dimension are: deforestation rate, amount of solid waste production, area of occupied land, etc.</i>
	<b>Water</b>	This dimension should contain indices to assess changes in water quality and its availability. Water is a precious resource especially in developing countries, where its provision for domestic and agricultural uses often represents one of the main workload for women and children. Due to the frequent water scarcity of rural areas, changes in the water consumption and contamination have to be accurately evaluated through specific indicators. <i>Examples of indicators may be: amount of depleted water, amount of contaminated water, etc.</i>
	<b>Air</b>	This dimension assesses changes of the quality of the air, both locally (assessing the local air quality) and globally (contribution to climate change). While the first refers to the local pollutants such as emissions of sulphur oxides, nitrogen oxides, carbon monoxide and particulate, the second assesses the Green House Gasses (GHGs) emissions. The relevance of this dimension is due to the fact that, especially in rural areas, the indoor air pollution caused by the use of solid fuel for cooking and heating is one of the main causes of disease and death. <i>To evaluate this dimension, examples of indicators can be:</i>

FIGURE 1 - The Evaluation Hierarchy



Sheet nr. 1: presentation of the Evaluation Hierarchy



B2      fx

A B C D E F G H I J K L M N O

**General Instructions**  
**TO DO:**  
 1) Within Column "Indicators" of TABLE 2 (yellow boxes) you should design and write two different indicators per Dimension. It is necessary to select only relevant indicators for the concerned project in terms of impact. Example of indicators are presented in the previous module.  
 2) Within Column "Type of Indicator" (yellow boxes) please select if the indicator is a "benefit" (namely that if it increases then it has a positive effect on beneficiaries) or "damage" (i.e. that if it increases then it has a negative effect on beneficiaries).  
 2) Within Columns "Ex-ante Value" and "Ex-post Value" (yellow boxes) you can assume a qualitative value for each selected indicator before (Ex-ante) and after (Ex-post) the project. Qualitative values must be selected from the Evaluation Scale (TABLE 3), from 1 (Very Low) to 5 (Very High). **CORREGGERE**  
**TO READ:**

**Read the general instruction:**  
**In this sheet the user is asked to fill in with some information**

TABLE 2 - Indicators Set					TABLE 3 - Effect					
n	Capital	Dimension	Indicators	Type of Indicator						
1	Natural Capital	Land		benefit						
2				benefit						
3		Water		benefit						
4			benefit							
5	Air			benefit						
6			benefit							
7	Physical Capital	Heavy Infrastructures		benefit						
8				benefit	#N/A	#N/A	NO CHANGE	=	Neutral	Neutral
9		Light Infrastructures		benefit	#N/A	#N/A	Moderate Increase	↑	Slightly Positive	Slightly Negative
10				benefit	#N/A	#N/A	Strong Increase	↑↑	Positive	Negative
11	Smart Infrastructures		benefit	#N/A	#N/A	Very strong Increase	↑↑↑	Highly Positive	Highly Negative	
12			benefit	#N/A	#N/A	Extreme Increase	↑↑↑↑	Extremely Positive	Extremely Negative	
13			benefit	#N/A	#N/A					
14	Human Capital	Education and Competences		benefit	#N/A	#N/A				
15			benefit	#N/A	#N/A					
16		Capabilities		benefit	#N/A	#N/A				
17	Health Status			benefit	#N/A	#N/A				
18			benefit	#N/A	#N/A					
19	Collaboration & Involvement			benefit	#N/A	#N/A				
20	Social Capital			benefit	#N/A	#N/A				

**Sheet nr. 2: the user has to fill in the list of indicators**

General Instructions

TO DO:

**Information to add:**  
- Name of the indicator (see also Appendix)

**Information to add:**  
- Type of the indicator (damage or benefit)

before (Ex-ante) and after (Ex-post) ...  
Low) to 5 (Very High).CORREGGERE

TO READ:

TABLE 2 - Indicators S

n	Capital	Dimension	Indicators	Type of Indicator	Change induced by the project	Effect
1	Natural Capital	Land		benefit	#N/A	#N/A
2				benefit	#N/A	#N/A
3				benefit	#N/A	#N/A
4		Water		benefit	#N/A	#N/A
5				benefit	#N/A	#N/A
6				benefit	#N/A	#N/A
7	Physical Capital	Heavy Infrastructures		benefit	#N/A	#N/A
8				benefit	#N/A	#N/A
9		Light Infrastructures		benefit	#N/A	#N/A
10				benefit	#N/A	#N/A
11		Smart Infrastructures		benefit	#N/A	#N/A
12				benefit	#N/A	#N/A
13	Human Capital	Education and Competences			#N/A	#N/A
14					#N/A	#N/A
15		Capabilities			#N/A	#N/A
16					#N/A	#N/A
17		Health Status			#N/A	#N/A
18	Social Capital	Collaboration & Initiatives		benefit	#N/A	#N/A
19				benefit	#N/A	#N/A
20				benefit	#N/A	#N/A

**Information to add:**  
- Change induced by the project on the indicator

TABLE 3 - Effect

Indicator change induced by the project	Effect (Benefit Indicators)	Effect (Damage Indicators)	
Extreme Decrease	↓↓↓↓	Extremely Negative	Extremely Positive
Very strong Decrease	↓↓↓	Highly Negative	Highly Positive
Strong Decrease	↓↓	Negative	Positive
Moderate Decrease	↓	Slightly Negative	Slightly Positive
NO CHANGE	=	Neutral	Neutral
Moderate Increase	↑	Slightly Positive	Slightly Negative
Strong Increase	↑↑	Positive	Negative
Very strong Increase	↑↑↑	Highly Positive	Highly Negative
Extreme Increase	↑↑↑↑	Extremely Positive	Extremely Negative

**Explanation of the effect of the values change**

Sheet nr. 2: the user has to fill in the list of indicators

**General Instructions**  
**TO READ:**  
 1) Indicators values are automatically normalized in order to make all indicators comparable to each other (TABLE 5)

**TABLE 5 - Normalization of Indicators**

n	Capital	Dimension	Indicators	Type of Indicato	Effect	Normalized Ex-ante	Normalized Ex-post	Differenc e
1	Natural Capital	Land	Deforestation	damage	Positive	0,300	0,700	0,400
2			Solid wastes	damage	Slightly Negative	0,600	0,400	-0,200
3		Water	Drinking water quality	benefit	Negative	0,700	0,300	-0,400
4			Water consumption	damage	Positive	0,300	0,700	0,400
5		Air	Local air pollutants emissions	damage	Slightly Negative	0,600	0,400	-0,200
6			CO2 emissions	damage	Slightly Negative	0,600	0,400	-0,200
7	Physical Capital	Heavy Infrastructures	Water services	benefit	Negative	0,700	0,300	-0,400
8			Extens				0,300	-0,400
9		Light Infrastructures	Energy				0,300	-0,400
10			Light d				0,300	-0,400
11		Smart Infrastructures	Access				0,600	0,200
12			Access				0,600	0,200
13	Human Capital	Education & Competences	Evenin				0,300	-0,400
14			Time f				0,600	0,200
15		Capabilities	Time for learning	benefit	Negative	0,700	0,300	-0,400
16			Capacity building to maintainers	benefit	Negative	0,700	0,300	-0,400
17		Health Status	Nutrition	benefit	Negative	0,700	0,300	-0,400
18			Health facilities	benefit	Slightly Positive	0,400	0,600	0,200
19	Social Capital	Collaboration & Initiatives	Ownership and empowerment	benefit	Negative	0,700	0,300	-0,400
20			Collective initiatives	benefit	Negative	0,700	0,300	-0,400
21		Equity & Inclusiveness	Access to electricity	benefit	Slightly Positive	0,400	0,600	0,200
22			Energy grid connections	benefit	Slightly Positive	0,400	0,600	0,200
23	Financial	Economic Status	Energy affordability	benefit	Slightly Positive	0,400	0,600	0,200
24			Energy security	benefit	Slightly Positive	0,400	0,600	0,200
25		Formal Economy	Income generating activities	benefit	Negative	0,700	0,300	-0,400

This sheet is a calculation sheet, where indicators values are normalized on a scale [0,1]

Sheet nr. 3: normalization

Within yellow boxes you can compare capitals in terms of Impact, by assigning an importance score.

Weights of Capitals	
IMPACT	% weight
Natural Capital	20%
Physical Capital	20%
Human Capital	20%
Social Capital	40%
Financial Capital	0%
100%	

Information to add:

- Weights of each capital, depending on its importance

Within yellow boxes you can compare the Dimensions in terms of their corresponding Capital, by assigning an importance score.

Weights of Natural Dimensions	
Natural Capital	% weight
Land	40%
Water	40%
Air	20%
100%	

Information to add:

- Weights of each dimension within each capital

Weights of Physical Dimensions	
Physical Capital	% weight
Heavy Infrastructures	33%
Light Infrastructures	33%
Smart Infrastructures	34%
100%	

Further information to add:

- Weights of each indicator within each dimension

Weights of Human Dimensions	
Human Capital	% weight
Education & Competences	10%
Capabilities	10%

Sheet nr. 4: the user has to fill in the weights values

General Instructions  
TO READ:  
1) Normalized indicators values and assigned % weights are aggregated to each other to climb the hierarchy

TABLE - Normalization of Indicators												
n	1	2	3	4	5	6	7	8	9	10	11	12
<b>Capitals</b>	Natural Capital						Physical Capital					
<b>Dimensions</b>	Land		Water		Air		Heavy Infrastructures		Light Infrastructures		Smart Infrastructures	
<b>Indicators</b>	Deforestation rat	land 2	Amount of water dep	wat 2	Local air polluta	air 2	Extention of hea 2	Access to appropriate	lig 2	Access to sma 2		
<b>Normalized Ex-ante Value</b>	0,667	0,667	0,200	0,333	0,200	0,200	0,375	0,375	0,375	0,750	0,750	0,750
<b>Normalized Ex-post Value</b>	0,333	0,333	0,800	0,667	0,800	0,800	0,625	0,625	0,625	0,625	0,250	0,250

IMPACT
Natural Capital
Physical Capital
Human Capital
Social Capital
Financial Capital

TABLE 8 - Weights of Capitals in terms of Impact		TABLES 9 - Weights of Dimensions in terms of their relative Capital		TABLES 10 - Weights of Indicators in terms of their relative Dimension	
Heavy Infrastructures	33%	Extention of public energy services	40%	Access to appropriate means of	50%
Light Infrastructures	33%	hea 2	60%	lig 2	50%
Smart Infrastructures	34%	sum	100%	sum	100%
sum	100%				
Human Capital	% weight	Education & Competences	% weight	Capabilities	% weight
Education & Competences	10%	Access to school for children	50%	Systems maintenance capab	50%
Capabilities	10%	edu 2	50%	cap 2	50%
Health Status	80%	sum	100%	sum	100%
sum	100%				

Smart Infrastructures	
Access to mobile	sma 2
Health Stat	Level of access to hea 2

This sheet is a calculation sheet, where values and weights are aggregated

Sheet nr. 5: aggregation



**General Instructions**

**TO READ:**

1) Numerical and graphical results of the impact evaluation are available for discussion, considerations and deeper analyses

**General Impact Scores**

	Impact
Ex-ante	45,98%
Ex-post	54,02%
Change	8,03%
Effect	Positive

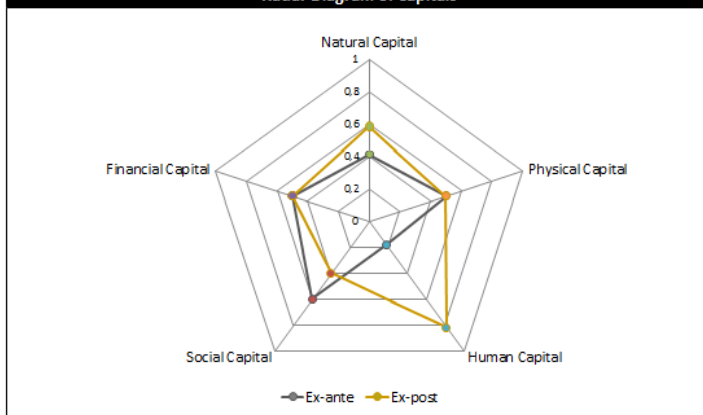
General Impact Scores show the overall effect - positive or negative - which the project may have on all Capitals in the whole. A higher general impact score for the situation *Ex-post* corresponds to a greater area comprised in the *Ex-post* pentagon within the **Radar Diagram of Capitals**, i.e. a sign of an overall positive impact.

**Impact Scores for Capitals**

	Natural Capital	Physical Capital	Human Capital	Social Capital	Financial Capital
Ex-ante	41,33%	50,25%	18,33%	60,00%	50,00%
Ex-post	58,67%	49,75%	81,67%	40,00%	50,00%
Change	17,33%	-0,50%	63,33%	-20,00%	0,00%
Effect	Positive	Negative	Positive	Negative	Neutral

Impact scores for capitals show the overall effect - positive or negative - which the project may have on each specific Capital. Each of their component represents the preference degree (in percentage) with which the situation after the project (*Ex-post*) is preferable or not than the situation before (*Ex-ante*) in terms of capitals. The comparison between the two values indicates the effect got for each capital, positive or negative. These values, ranging between 0 and 100%, can be represented

**Radar Diagram of Capitals**



**This sheet presents the final results in terms of:**

- Change in capitals
- Change in dimensions

**It also provides different types of visualization of the outputs**

**Sheet nr. 6: final impact evaluation**

## Supporting materials

List of Alerts and other suggested indicators, with detailed description

Capital	Dimensions	Indicators	Description
Natural Capital	Land	Deforestation rate	Amount of forest areas destroyed, or degraded, due to firewood collection for energy uses (cooking, heating and lighting)
		Solid wastes production amounts	Amount of production of solid wastes not properly disposed, which threat the land
		Area of occupied land	Amount of land occupied by installed energy technologies, and which could instead used for other purposes (such as agriculture, working activities, etc.)
	Water	Amount of water depleted	Amount of water consumed and not returned at the same conditions
		Amount of contaminated water	Amount of water polluted and not purified before returning to the environment
	Air	Local air pollutants emissions	Quantity of local air pollutants (smoke, PM2.5, NOx, SOx, etc.) emitted due to electricity, heat and light production
Physical Capital	Heavy Infrastructures		and/or drainage systems
	Light Infrastructures	Capacity of local energy systems	Total amount of energy capacity installed locally (in Mw) in target area
		Access to basic appliances	Share of households which have access to refrigerators and lamps
	Smart Infrastructures	Access to mobile phones	Share of population with access to mobile phones
		Access to internet	Share of population with access to internet
		Access to TV and radios	Share of population with access to Information and Communication Technologies, such as TVs and radios
Education & Competences	Access to school for children	Share of children which have access to school	

This sheet gives a list of Alerts (mandatory indicators) and other suggested indicators, to use in sheet nr.2