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# Evaluating GHG emissions using the Bonsucro calculator

Consistent and based on actual production data



# The Bonsucro Calculator

- For a mill and farm to demonstrate compliance with the Bonsucro Production Standard, they must complete the Bonsucro calculator reporting their actual production data.



# Bonsucro Calculator Input Data



Indicator Reference	Company General Data	Input	Verifier	Personal notes	Description	Total production	Certifiable production only
1	<b>BONSUCRO SUSTAINABILITY STANDARDS METRICS CALCULATOR</b>						
2	<b>Data Input Sheet</b>						
3	Bonsucro indicators are calculated on different pages for principles 1, 2, 3, 4 and 5, and separated between grower and miller requirements. A separate page for transport of cane is included, since it may be either a grower or a miller responsibility.						
4	Data entered is for one year. Data can only be entered by filling in the yellow fields here, and the data is transferred to the yellow fields on the following spreadsheets.						
5	<b>BONSUCRO</b>						
6	Name of the Company	Anczar Mill					
7	Start date of assessment	10/10/2014			Format: mm/yy		
8	End date of assessment	10/09/2014			Format: mm/yy		
9	Currency used	RS			You can choose the currency of your country; a conversion to US \$ is done later in the spreadsheets	*	*
10	5.9.1 Currency exchange rate (1\$ = ?)	3.05	RS		<a href="http://www.xe.com">www.xe.com</a>	*	*
11	Sugarcane production	150200	tonnes		This should be the total amount of cane harvest from the farms within the unit of certification		*
12	Area planted to cane and seed (unit of certification)	30000	ha		This is area to be certified. It should not include roads, fire breaks etc. Includes harvested and non harvested area.		*
13	Total supplying area to the mill	70500	ha		This is the total area supplying cane to the mill (inside and outside the unit of certification, own land, rented, independent farms) - for statistical use only	*	
14	Sugarcane processed	3100200	tonnes		This should be the total amount of cane processed at the mill	*	
15	Sugar production	250500	tonnes		This should be the total amount of sugar produced at the mill	*	
16	Ethanol production	90000	m <sup>3</sup>		Total volume of alcohol product (enter 0 if no ethanol produced)	*	
17	Molasses produced	175666300	tonnes			*	
18	Fuel oil produced	0	L			*	
19	Yeast produced	0	tonnes			*	
20	Others products produced	0	tonnes			*	
		<b>Agriculture</b>					
22	3.1.2 Area harvested (irrigated)	7800	ha		Irrigated means systems that rely on external waters to grow		*
23	3.1.2 Total sugarcane harvested (area harvested irrigated)	450600	t cane		Irrigated means systems that rely on external waters to grow		*
24	3.1.2 Average age at harvest (irrigated)	12.7	months				*
25	3.1.2 Area harvested (strategic/supplementary irrigation)	0	ha		Strategic/supplementary means systems where waters are applied to cover irregular rain deficiencies or to further enhance production		*
26	3.1.2 Total sugarcane harvested (strategic/supplementary irrigation)	0	t cane		Strategic/supplementary means systems where waters are applied to cover irregular rain deficiencies or to further enhance production		*
27	3.1.2 Average age at harvest (strategic/supplementary irrigation)	0	months				*
28	3.1.2 Area harvested (dryland)	15300	ha		Dryland means systems where no external waters are added		*
29	3.1.2 Total sugarcane harvested (dryland)	950600	t cane		Dryland means systems where no external waters are added		*
30	3.1.2						*

# Methodology Tabs in Calculator – offers details of calculation



## Example Methodology

37						
39	Norma 5.3	Indicador	Padrão	Verificador	Conformidade	Descrição
	Aperfeiçoar continuamente a qualidade dos produtos do engenho de açúcar.	Conteúdo total de açúcares fermentáveis de cana, expresso como inversão (TSAI)	> 120	kg / t cana	EM CONFORMIDADE	Utilizado se Etanol for produzido, por si ou em conjunção com produção de açúcar. Com base em 90,5% de utilização de Açúcares Totais Como Inversão (TSAI). Conhecidos no Brasil como ATR. O valor para o período de relato ou média de rotação de 5 anos pode ser utilizado.
40						
41	Dados da empresa 5.3.2	Indicador	04/2013 a 03/2014			
42						
43		Conteúdo total de açúcares de cana, expresso como açúcares de redução (ATR)	13.8 %			
44						
45		Conteúdo de sacarose da cana	15.1 %			
46		Açúcar de redução / proporção de sacarose na cana ou em suco bruto	0.7 %			
47		Conteúdo total de açúcares de cana, expresso como açúcares de redu	13.8 %			
48						
49	Resultados da Empresa 5.3.2	Conteúdo total de açúcares fermentáveis de cana, expresso como inversão (ATR)	124.9	kg / t cana	EM CONFORMIDADE	

For internal use only

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## *Criterion 3.2* To monitor global warming emissions with a view to minimizing climate change impacts

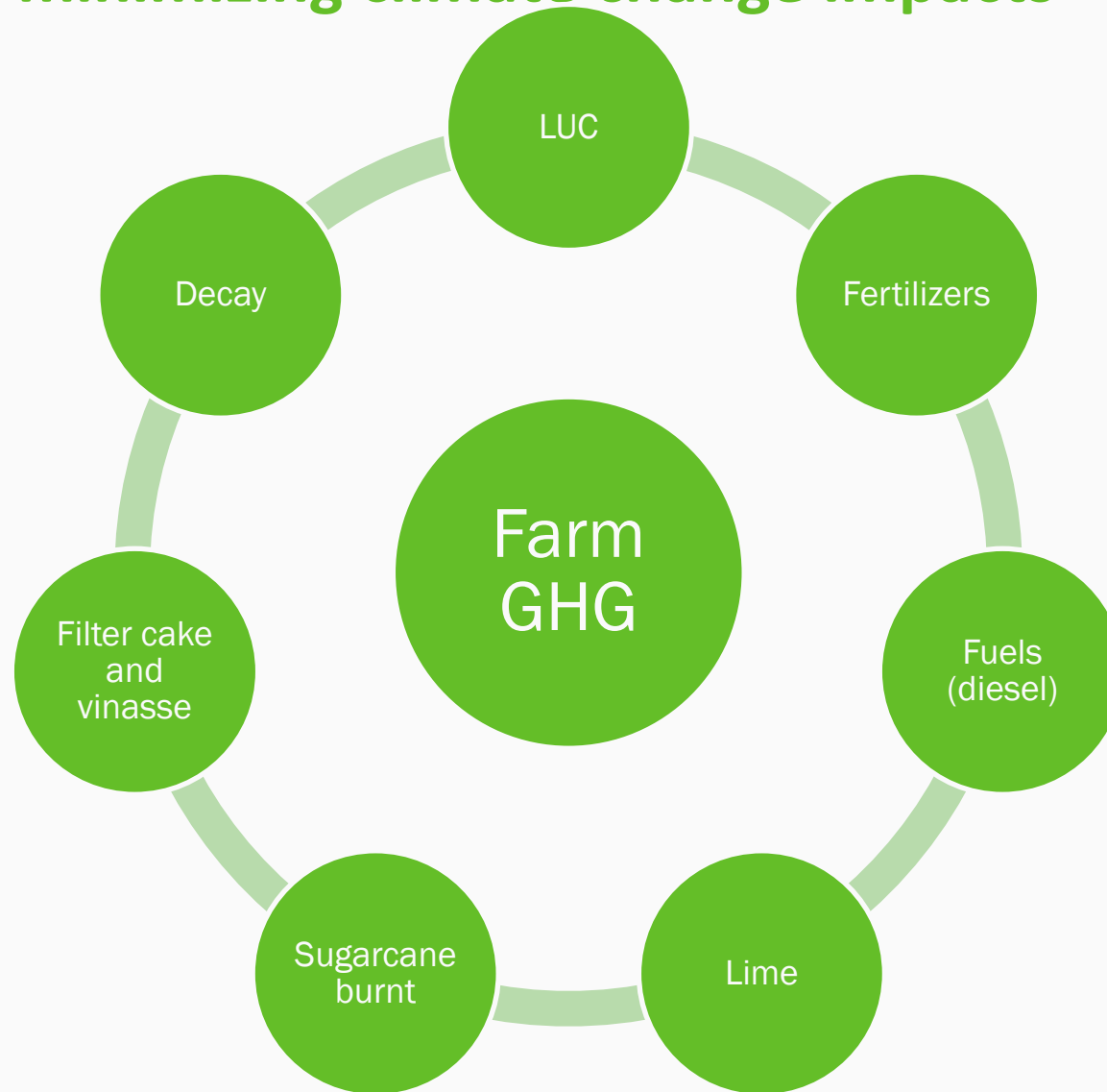
*3.2.1 GHG emissions per tonne of cane*

*3.2.2 GHG emissions per tonne of sugar produced*

*3.2.3 GHG emissions per MJ of ethanol*

*This is a field-to-mill gate calculation, based on a Life Cycle Assessment of the processes. Global warming burden is expressed as the net equivalent carbon dioxide emission, related to the amount of cane produced, or the amount of sugar produced, or energy content of ethanol. The Bonsucro Calculator provides a built-in greenhouse gas calculator.*

## Criterion 3.2 To monitor global warming emissions with a view to minimizing climate change impacts



### Calculating the Farm Contribution:

Average values for all supplying farms are required for the estimate of GHG emissions per unit of final product – where not feasible, it may be possible to use estimated values for all farms included in the unit of certification, pending the estimate can be justified.

## Calculator incorporate the EU Renewable Energy Directive methodology for Land Use Change calculation

Indicator	Land use change 1	Land Use Change 2	Land use change 3	Land use change 4	
Total area harvested	59,900.00				ha
Total ethanol production	200,000.00				m3
HV ethanol	21.20				MJ / L EtOH
Land use change due to agriculture after January 2008	yes	yes	yes		Yes/No
SOC <sub>st</sub> previous use of land	47	60	47		t carbon / ha
F <sub>LU</sub> previous land	1	1	1		
F <sub>MG</sub> previous land	0.7	0.97	0.7		
F <sub>I</sub> previous land	1	1	1		
SOC previous use of land	32.90	58.20	32.90	0.00	t carbon / ha
C <sub>veg</sub> previous use of land	8.1	8.1	8.1		t carbon / ha
CS <sub>R</sub>	41.00	66.30	41.00	0.00	t carbon / ha
SOC <sub>st</sub> sugarcane	47	60	47		t carbon / ha
F <sub>LU</sub> sugarcane	0.48	0.48	0.48		
F <sub>MG</sub> sugarcane	1	1	1		
F <sub>I</sub> sugarcane	1.11	1	1		
SOC sugarcane	25.04	28.80	22.56	0.00	t carbon / ha
C <sub>veg</sub> sugarcane	5	5	5		t carbon / ha
CS <sub>A</sub>	30.04	33.80	27.56	0.00	t carbon / ha
Productivity factor	70784.64				MJ/ha
e <sub>l</sub>	28.36	84.11	34.78449509	0	g CO <sub>2</sub> /MJ fuel/year
Percentage GHG allocated to ethanol (energy basis)	49.98				%
Annualised land use emissions	14.18	42.04	17.39		g CO <sub>2</sub> /MJ fuel/year
e <sub>ec</sub>	28.18	56.04	31.39		

## *GHG Protocol at farm*

Farm Scope 1	Farm Scope 2	Farm Scope 3
<ul style="list-style-type: none"><li>• Agrochemical applied</li><li>• Fuel usage</li><li>• Sugarcane burnt</li><li>• Decay</li><li>• Transportation cane</li></ul>	<ul style="list-style-type: none"><li>• Electricity used (including for irrigation)</li></ul>	<ul style="list-style-type: none"><li>• Agrochemical production and transportation</li><li>• LUC</li></ul>

When displaying result per Tonne of Sugar as Scope 1, 2 and 3, we operate an economic allocation



## Criterion 3.2 To monitor global warming emissions with a view to minimizing climate change impacts



**Calculating the Mill Contribution:**  
 All industrial inputs including data on the transportation of the cane from the field, data on additional energy sources or chemical products are required as well as information on water treatment practices. The quality of the cane will affect the level of emissions coming from the burning of the bagasse in the boilers.

A credit is achieved by exporting bagasse and power generated in cogeneration. The calculation assumes that additional export power generated in condensing turbines also attracts a credit.

## *GHG Protocol at mill*

### Mill Scope 1

- Bagasse combustion
- Fuel usage
- Process water and effluent treatment
- Chemical usage

### Mill Scope 2

- Electricity imported

### Mill Scope 3

- Import bagasse
- Chemical production and transportation

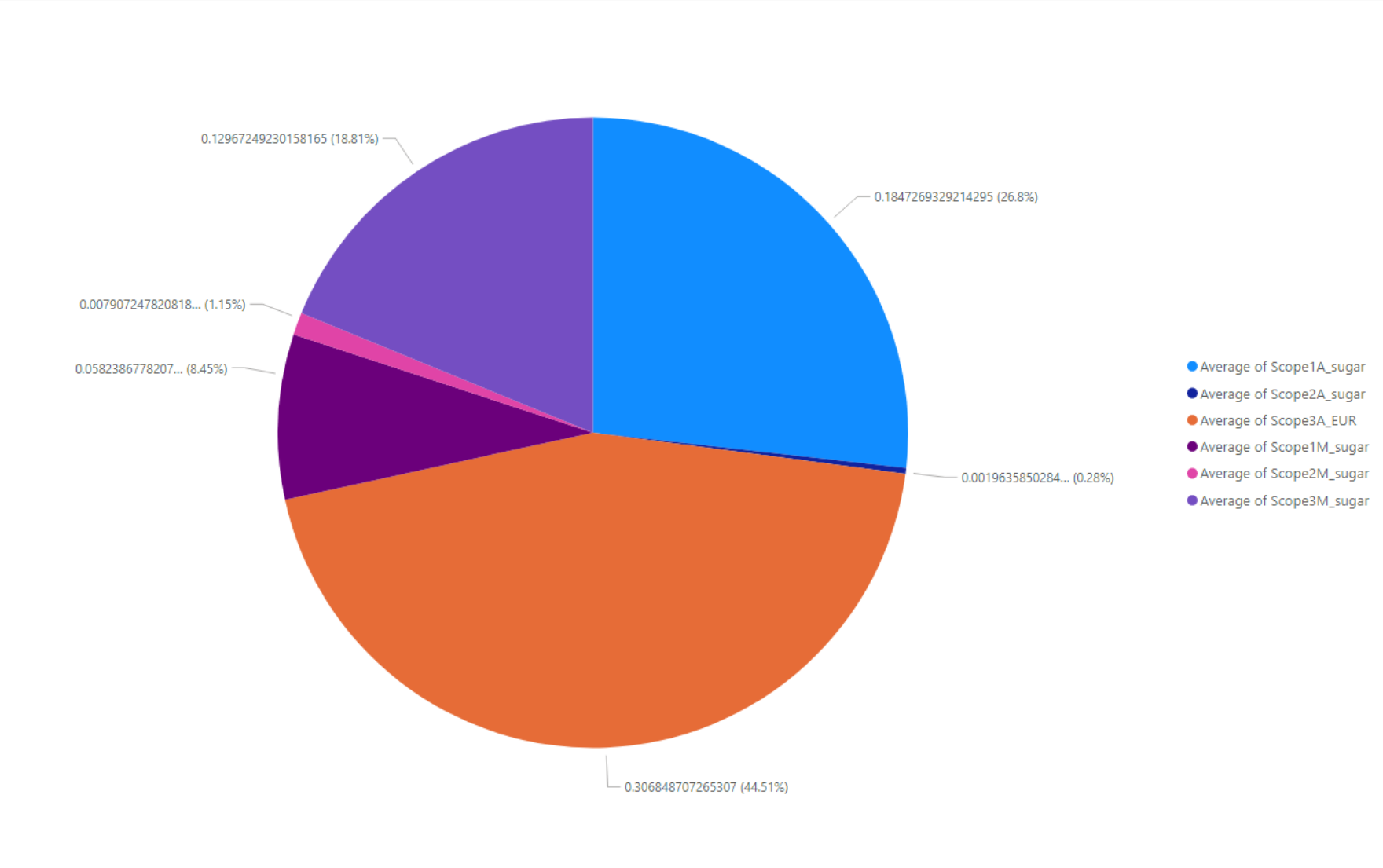
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Some insight in what certified  
producers have achieved

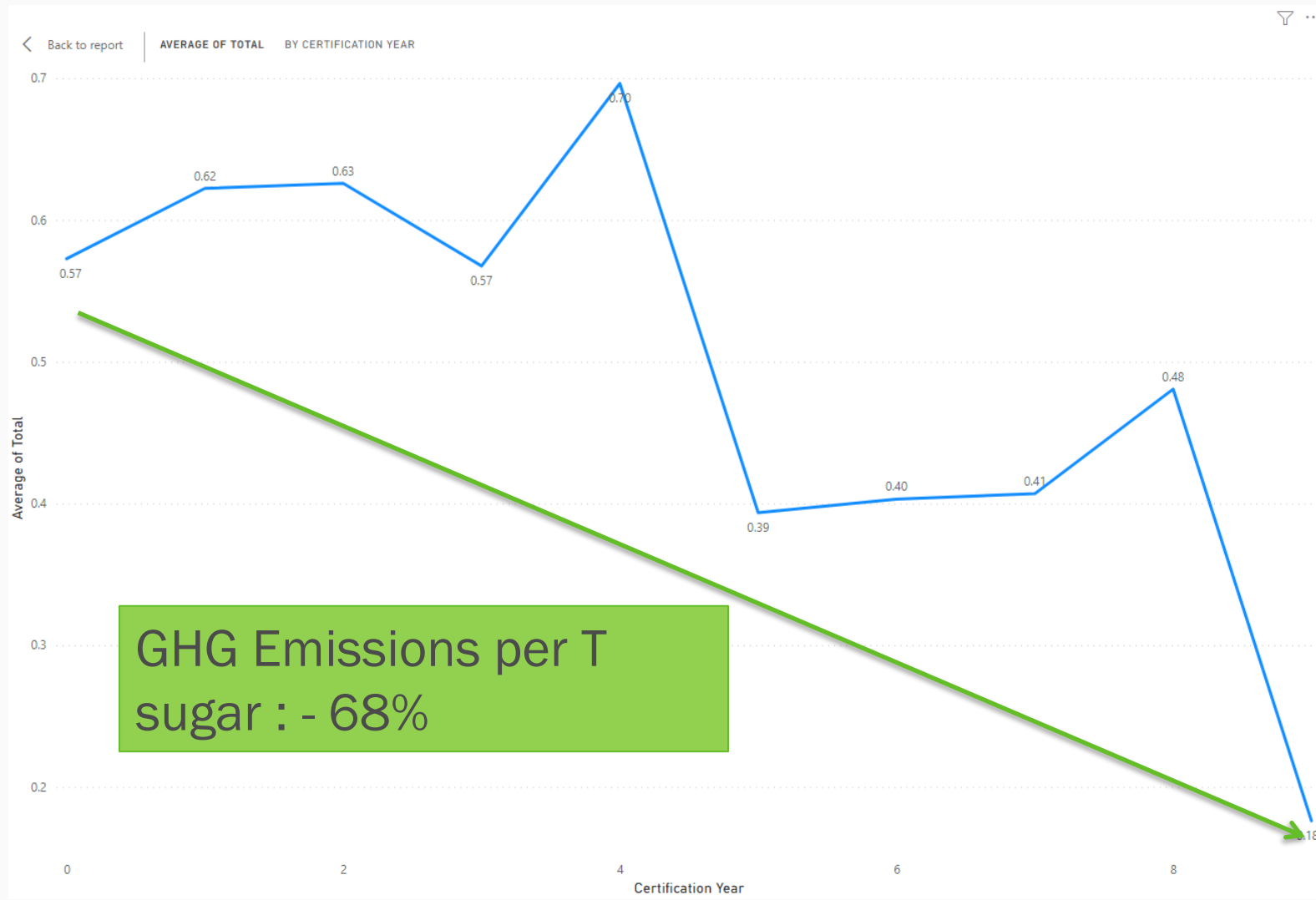


The global sugarcane platform

*Average emissions PepsiCo certified supply chain (season 2019/20, all reporting producers)*



# Certified producers reduce their GHG footprint over years of certification



Want to know more? Do get in touch!

