



HUERTOS URBANOS: I+D+i+d

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N	ACTIVIDAD
1	Concepto de I+D+i+d
2	Concepto de “Huerto Urbano” (HU)
3	Ubicación: Campus de Excelencia Internacional
4	Investigación: Impermeabilizantes
5	Investigación: Sustratos
6	Investigación: Fertirrigación y recirculación
7	Investigación: CO ₂
8	Investigación: Iluminación
9	Cuidados, recolección y aprovechamiento
10	Difusión

INVESTIGACIÓN + DESARROLLO

I INVESTIGACIÓN
 $\text{€} \rightarrow \text{Conocimiento } (C_i)$

D DESARROLLO
 $C_i + C_j \rightarrow C_k$

i INNOVACIÓN
 $\text{Conocimiento} \rightarrow \text{€}$

d DIVULGACIÓN

Madri+D

HUERTOS ECOLÓGICOS

Campus Excelencia
Complutense + Politécnica
(50 Centros)



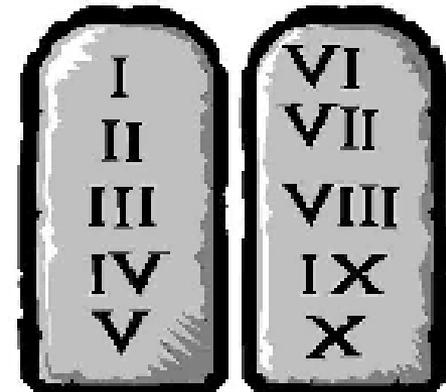
ACCIONES:

1. Recuperar suelo
2. Aislamiento térmico
3. Eficiencia hídrica
4. Ocupación "rural"
5. Producto ecológico
6. Distribución ONGs
7. Hoteles ecológicos
8. IDAE → Normativa
9. Bus demostración

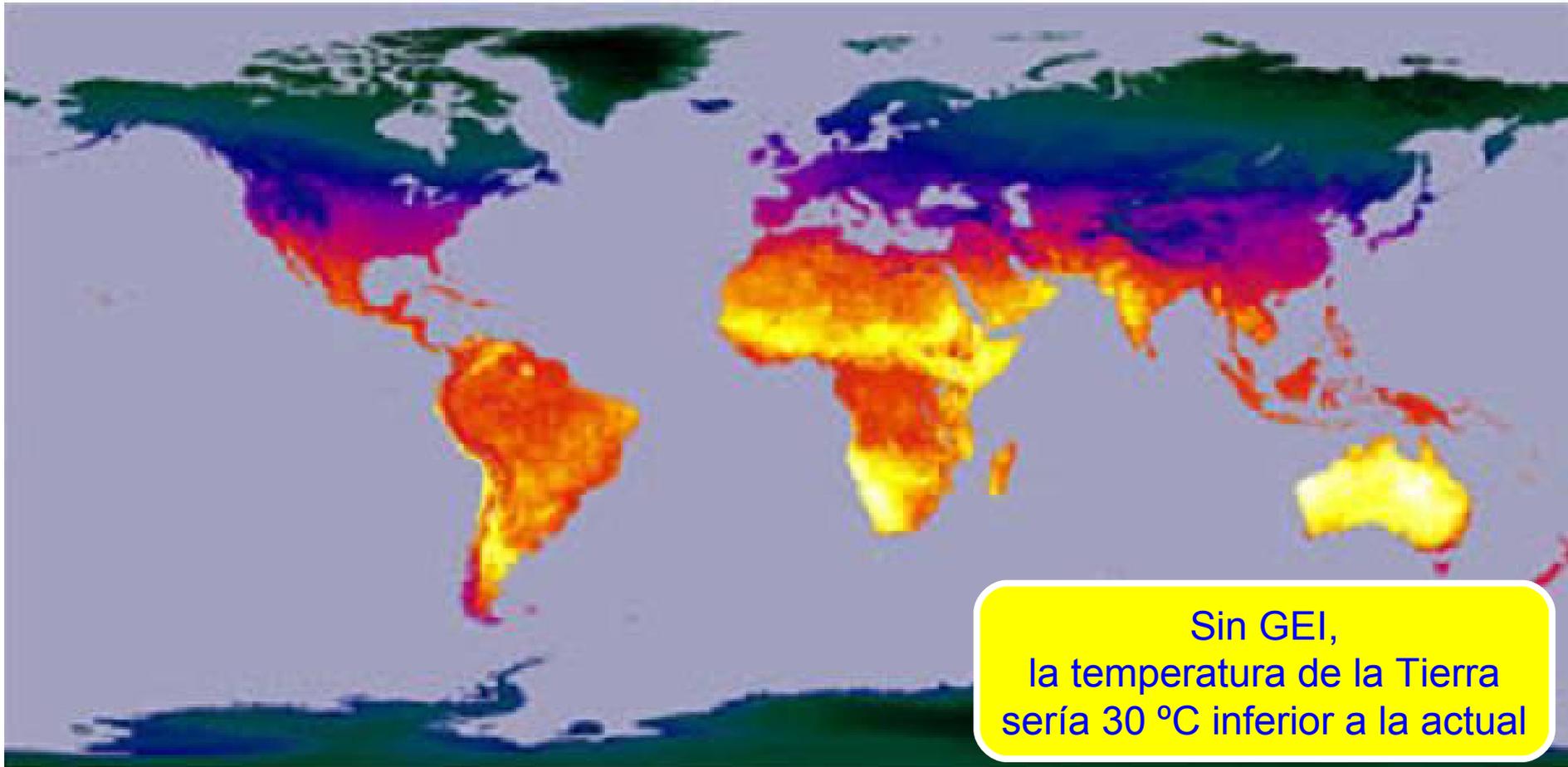
ACCIÓN BILATERAL: ESPAÑA – MÉXICO
(IBEROEKA: CDTI – CONACYT)

SOSTENIBILIDAD

1. No ocupar suelo fértil
2. Balance energético positivo
3. Mínima emisión de GEI
4. Mínimo impacto medioambiental
5. Mínimo empleo de fertilizantes
6. Mínimo consumo de agua
7. No utilizar agua de consumo humano
8. Económicamente viable
9. Duradero
10. Heredable



TEMPERATURA DE LA TIERRA

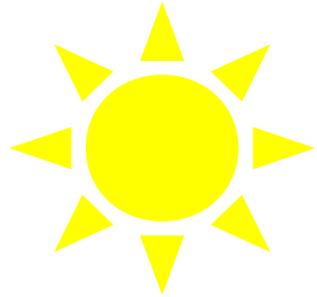


TEMPERATURA (°C)

- 35

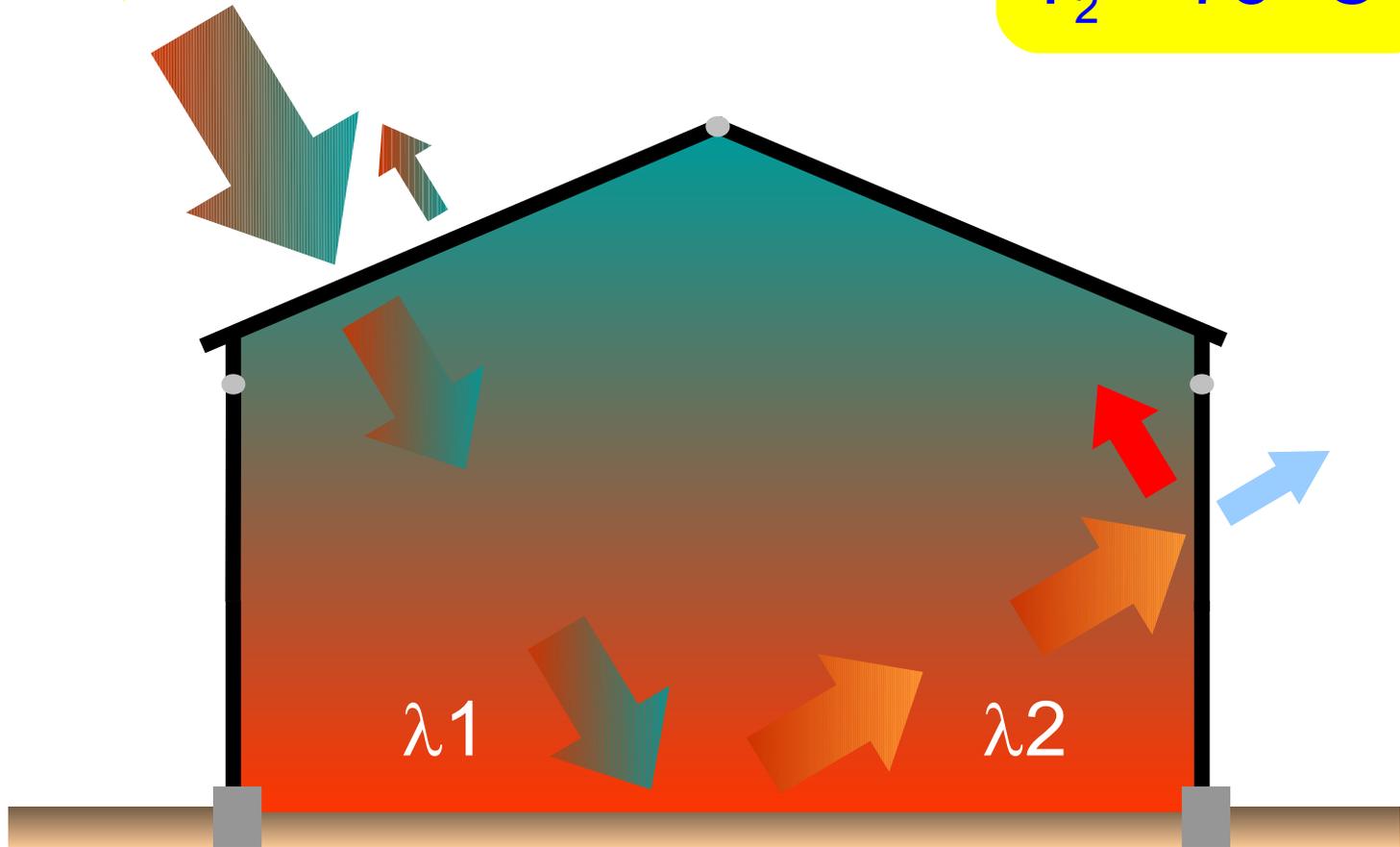
50

EFEECTO INVERNADERO

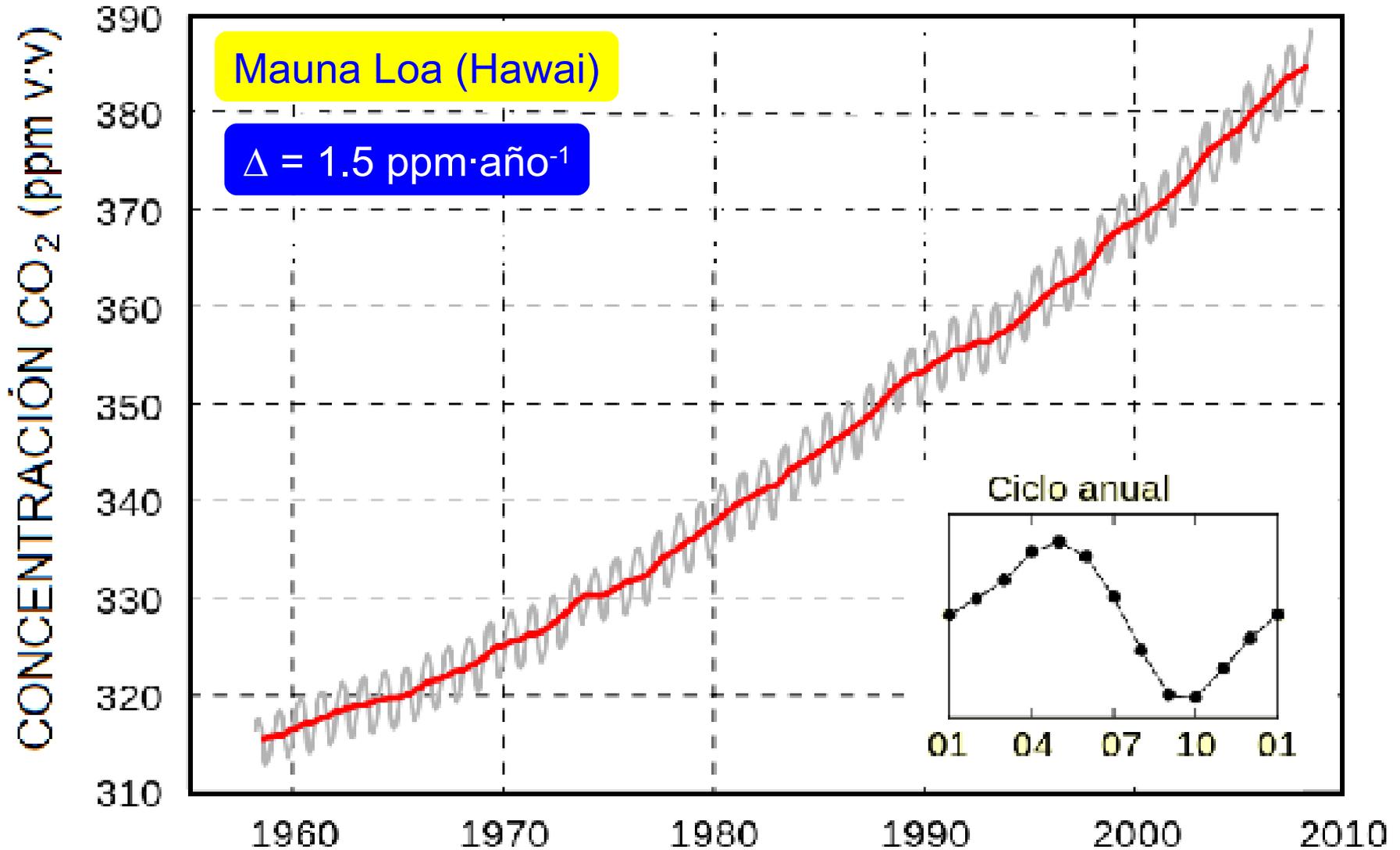


$$T_1 = 40\text{ }^{\circ}\text{C}$$

$$T_2 = 75\text{ }^{\circ}\text{C}$$

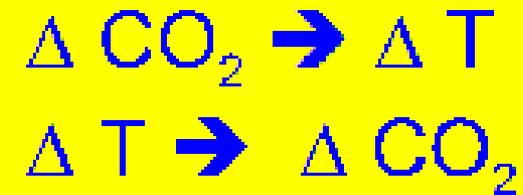
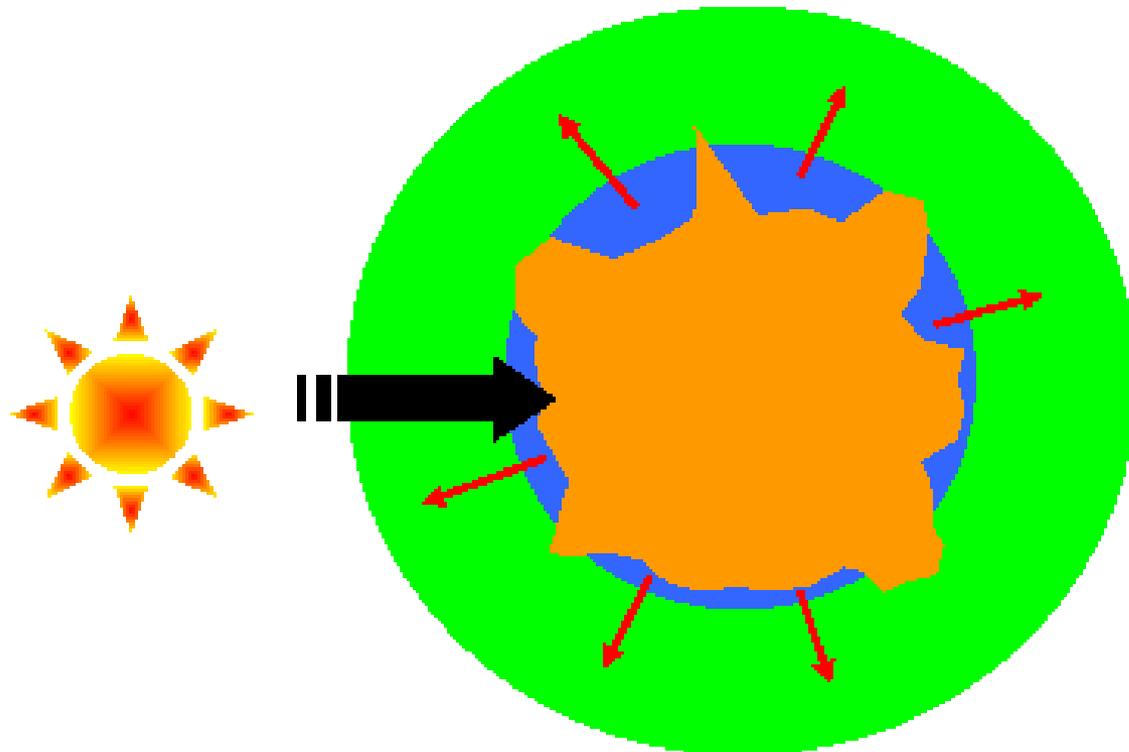
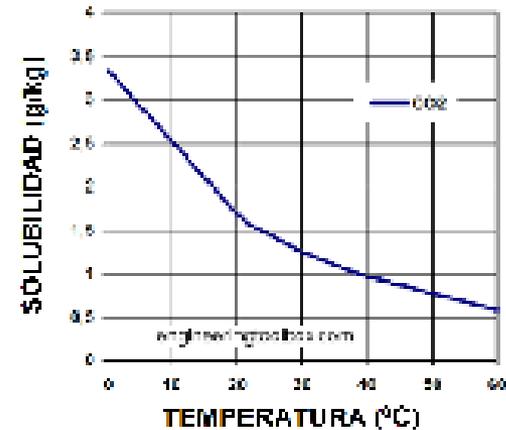


REFERENCIA PARA CO₂



CO₂: ¿CAUSA Ó EFECTO?

$$C = k \cdot P$$



- TIERRA
- AGUA
- AIRE
- CO₂

“HUELLA DEL CARBONO”



working with
the Carbon Trust

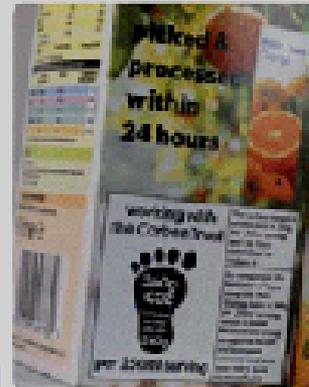


per carton

The carbon footprint of this ju
is 220g per carton and we ha
committed to reduce it.



working with
the Carbon Trust



E.LECLERC

working with
the Carbon Trust



to be prepared for Heat Cons by TM

myclimate
Protect our planet



HUELLAS (*FOOTPRINT*)



AGUA VIRTUAL

Carne vacuno	15,497
Embutidos	11,535
Carne cerdo	6,309
Queso lonchas	4,914
Carne pollo	3,918
Huevos	3,340
Queso fresco	3,094
Yogur	1,151

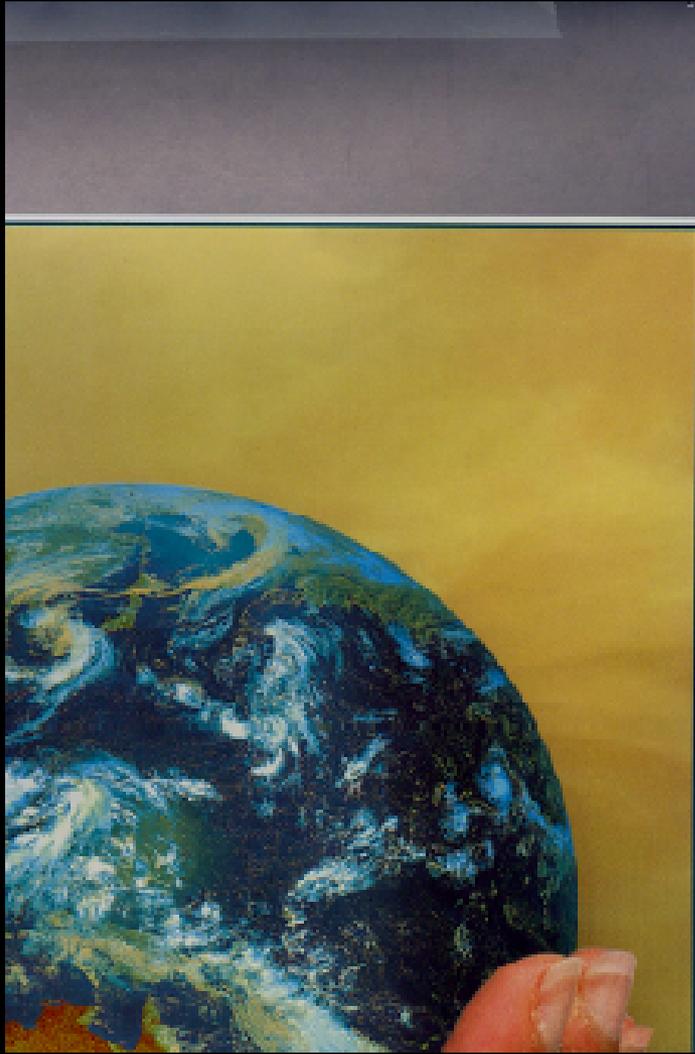
Higos	3,160
Cerezas	1,543
Aguacate	1,284
Manzana	697
Naranja	457
Fresa	276
Patata	255
Berenjena	208
Algas	< 100

Pantalón	11,000
Sábana	10,600
Camiseta	2,900
Vaso leche	200
Taza café	140
Copa vino	120
Caña cerveza	75
Taza té	34

Litros de agua para producir 1 kg de producto o una unidad

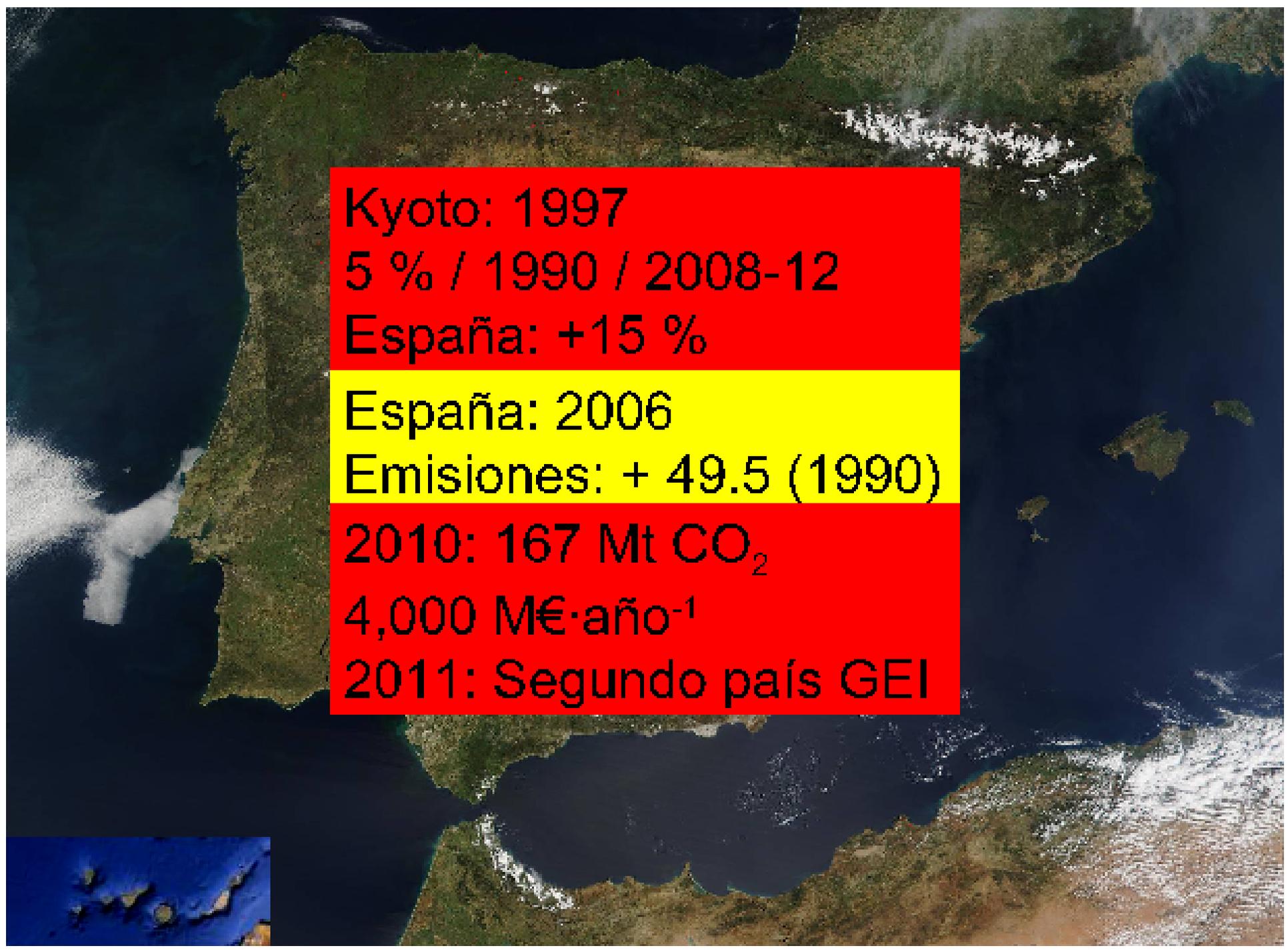
CAMBIO CLIMÁTICO

ADAPTACIÓN



MITIGACIÓN

IPCC

An aerial photograph of a coastal region, likely in Spain, showing a mix of green vegetation, brownish terrain, and dark blue water. A large red rectangular box is overlaid on the center of the image, containing text. A smaller yellow rectangular box is also overlaid, containing text. The text provides information about carbon emissions and the Kyoto Protocol.

Kyoto: 1997

5 % / 1990 / 2008-12

España: +15 %

España: 2006

Emisiones: + 49.5 (1990)

2010: 167 Mt CO₂

4,000 M€·año⁻¹

2011: Segundo país GEI

I. DISPOSICIONES GENERALES

MINISTERIO DE MEDIO AMBIENTE, Y MEDIO RURAL Y MARINO

17631 *Real Decreto 1494/2011, de 24 de octubre, por el que se regula el Fondo de Carbono para una Economía Sostenible*

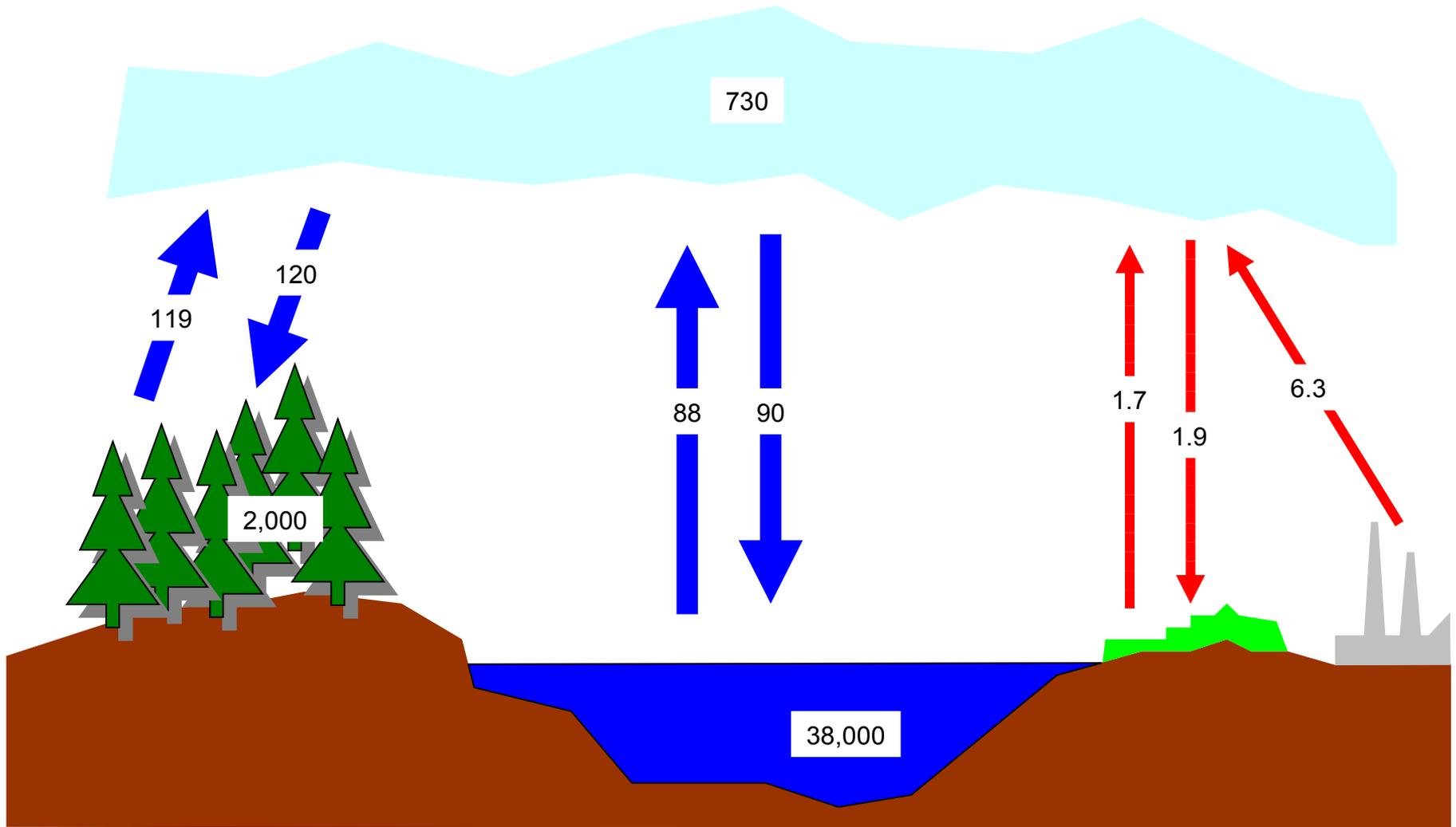


Presentación de propuestas para el desarrollo de “PROYECTOS CLIMA”

Este documento pretende ofrecer una guía básica para la presentación de propuestas de proyectos de reducción de emisiones de gases de efecto invernadero ubicados en España, “proyectos clima”, de acuerdo con el *RD 1494/2011, de 24 de octubre, por el que se regula el Fondo de Carbono para una Economía Sostenible*¹.

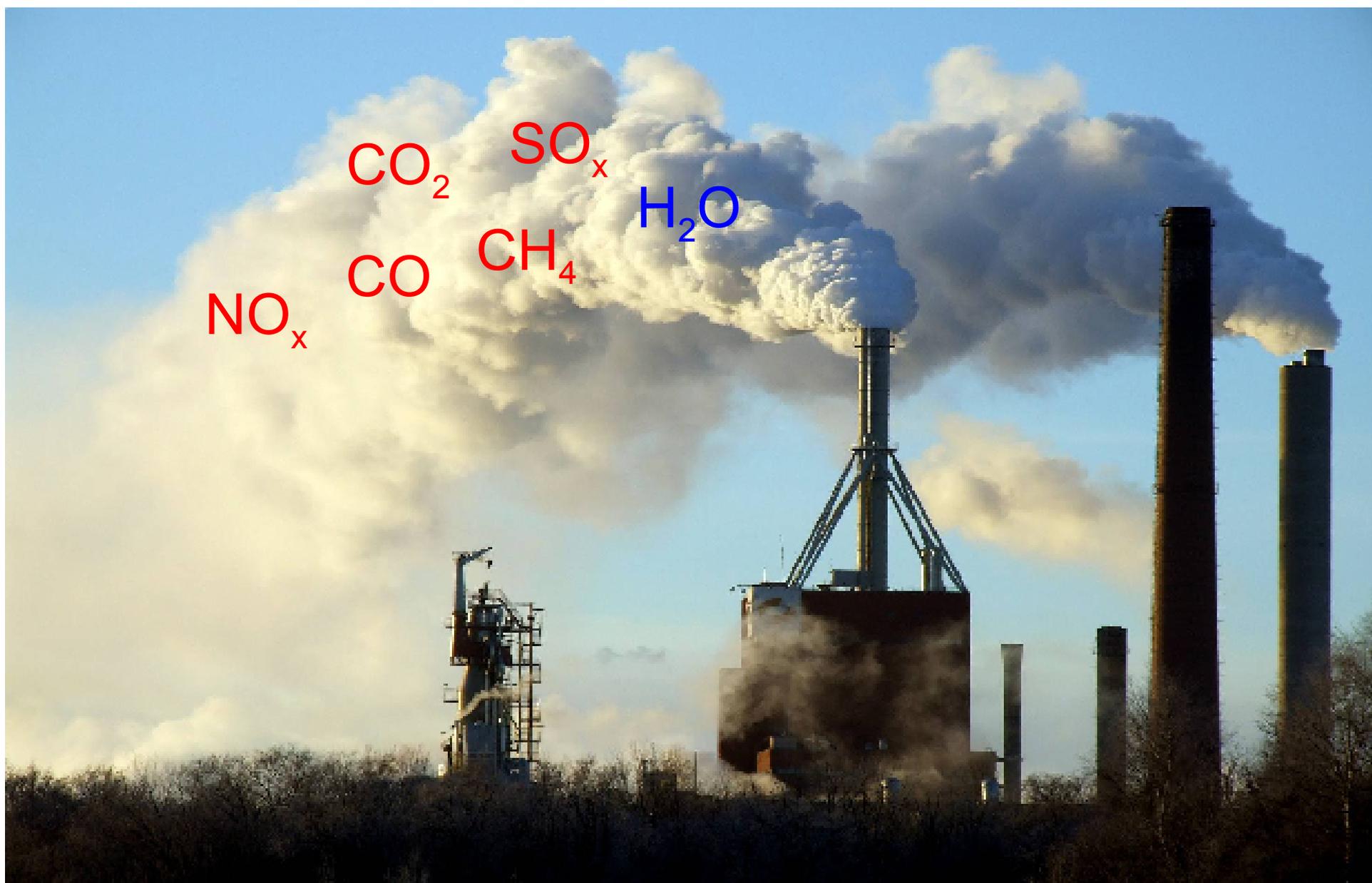


FLUJO CO₂ (Gt·año⁻¹)



GASES EFECTO INVERNADERO: GEI

CO_2 SO_x
 H_2O
 NO_x CO CH_4



CULTIVOS BAJO PLÁSTICO



Tomate: $150 - 300 \text{ kg} \cdot \text{ha}^{-1} \cdot \text{día}^{-1}$

ECOTASAS

- **PAÍSES:**

Alemania

Columbia británica

Dinamarca

Finlandia

Francia

Italia

Nueva Zelanda

Reino Unido

Suecia

Suiza



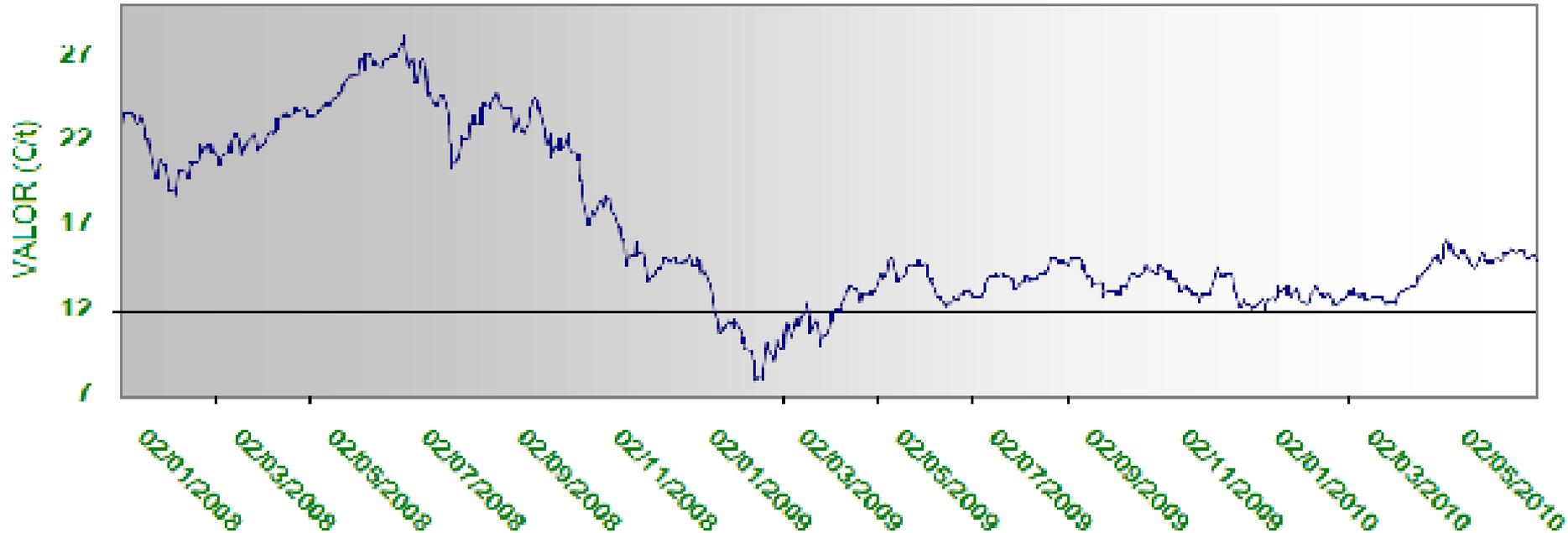
- A partir de 1,990
- Leyes (C; Energía)
- 10 – 30 € / t CO₂

"BONOS" DE CO₂ (2008 – 12)

Un "Bono de CO₂"
equivale a la fijación
o retirada de una
tonelada métrica de
dióxido de carbono
de la atmósfera.



MERCADO DE CO₂



Mercado de Emisiones: **ETS** (*European Trading System*)

Mecanismos de Desarrollo Limpio: **CDM** (*Clean Development Mechanisms*)

Actuación Conjunta: **JI** (*Joint Implementation*)

CER

Emission Reduction Certificate

Off-grid Residence

14,100,801 tonnes CO₂



3001 Cedar Brook Off-grid Residence

Production: 141,008,010 kWh (14,100,801 tCO₂)
Location: Williston, Florida
Country: United States

Carbon Sink:
Sink Type: Off-grid Residence
Sink Material: Concrete, Wood, Asphalt
Sink GHG Rate: 53 kgCO₂/kWh
Sink Reduction Rate: 14,100,801 tCO₂/yr

Emission Reductions Created by:
United and NCCU Corp
17271 NE 26th Ave
Williston, FL 32094, US
co2choices@nccu.com

Production: 100,000,000 kWh (10,000,000 tCO₂)
Location: Seminole Electric Cooperative
over Central Area (SECA), Florida
Country: United States

Carbon Source:
Source Type: Coal-fired Utility Plant
Source Name: Up. Coal 88.65%
Oil 7.17%
Gas 0.18%
Source Output: 10,000,000 kWh/yr
Source Emission Rate: 100,000,000 tCO₂/yr

Emission Reductions Certified by:
NCCU, Inc.
8650 NW 12th Avenue
Williston, FL 32094-0001, US

Representative of NCCU, Inc. (United and NCCU Corp)

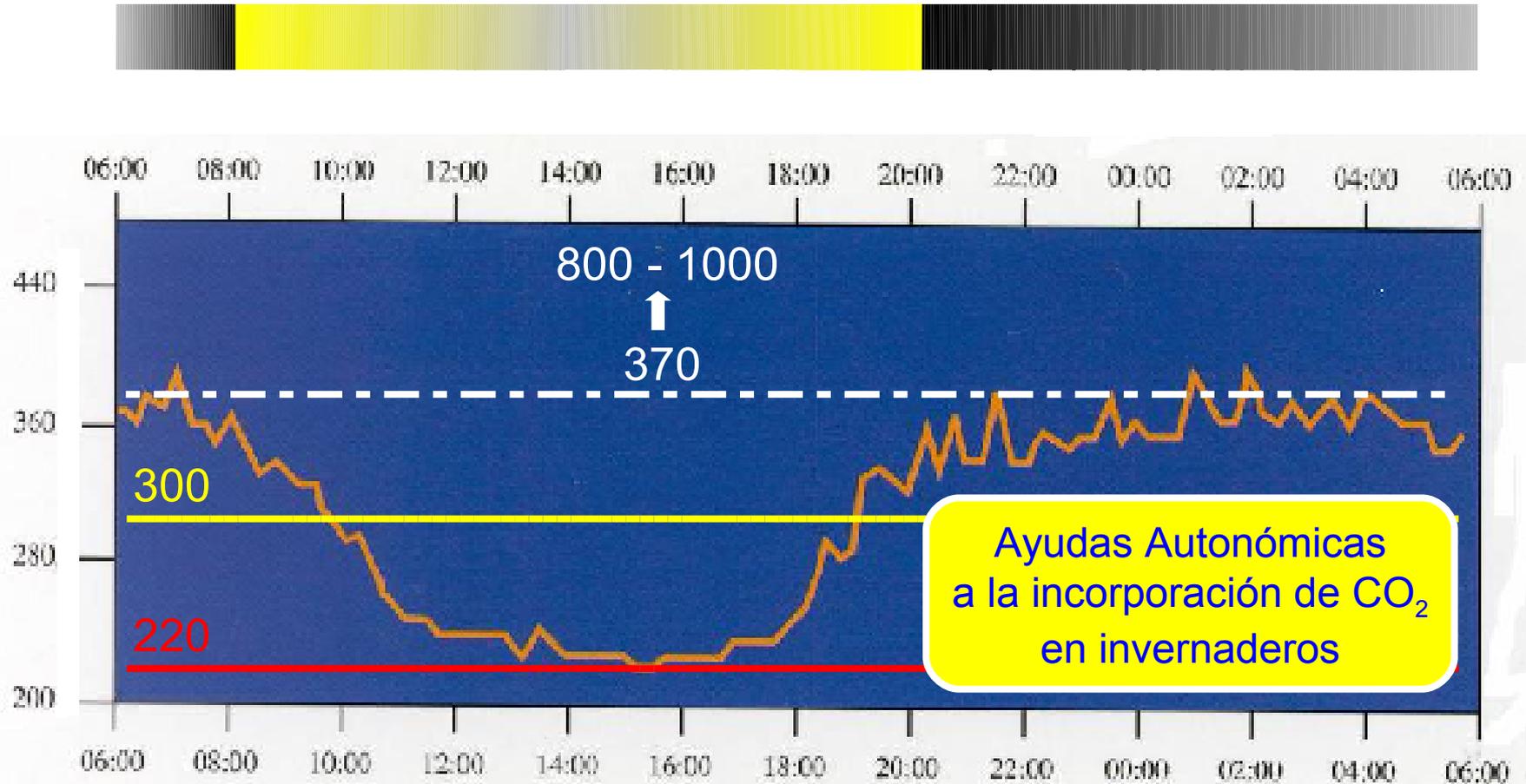
US CERTIFICATION # 000000172

This certificate represents the voluntary offset of Carbon Dioxide (CO₂) and other selected greenhouse gases in metric tons (tCO₂e) for the purpose of offsetting the emissions of other sources in the United States. The offset is generated by the project described by the project identifier on the front of this certificate. The project identifier is 17271 NE 26th Ave, Williston, FL 32094, US. The project is certified by NCCU, Inc. (United and NCCU Corp) and is certified by the United States Department of Energy. The project is certified by NCCU, Inc. (United and NCCU Corp) and is certified by the United States Department of Energy. The project is certified by NCCU, Inc. (United and NCCU Corp) and is certified by the United States Department of Energy.

CO₂ EN INVERNADERO



BALANCE CO₂ (mL·m⁻³)



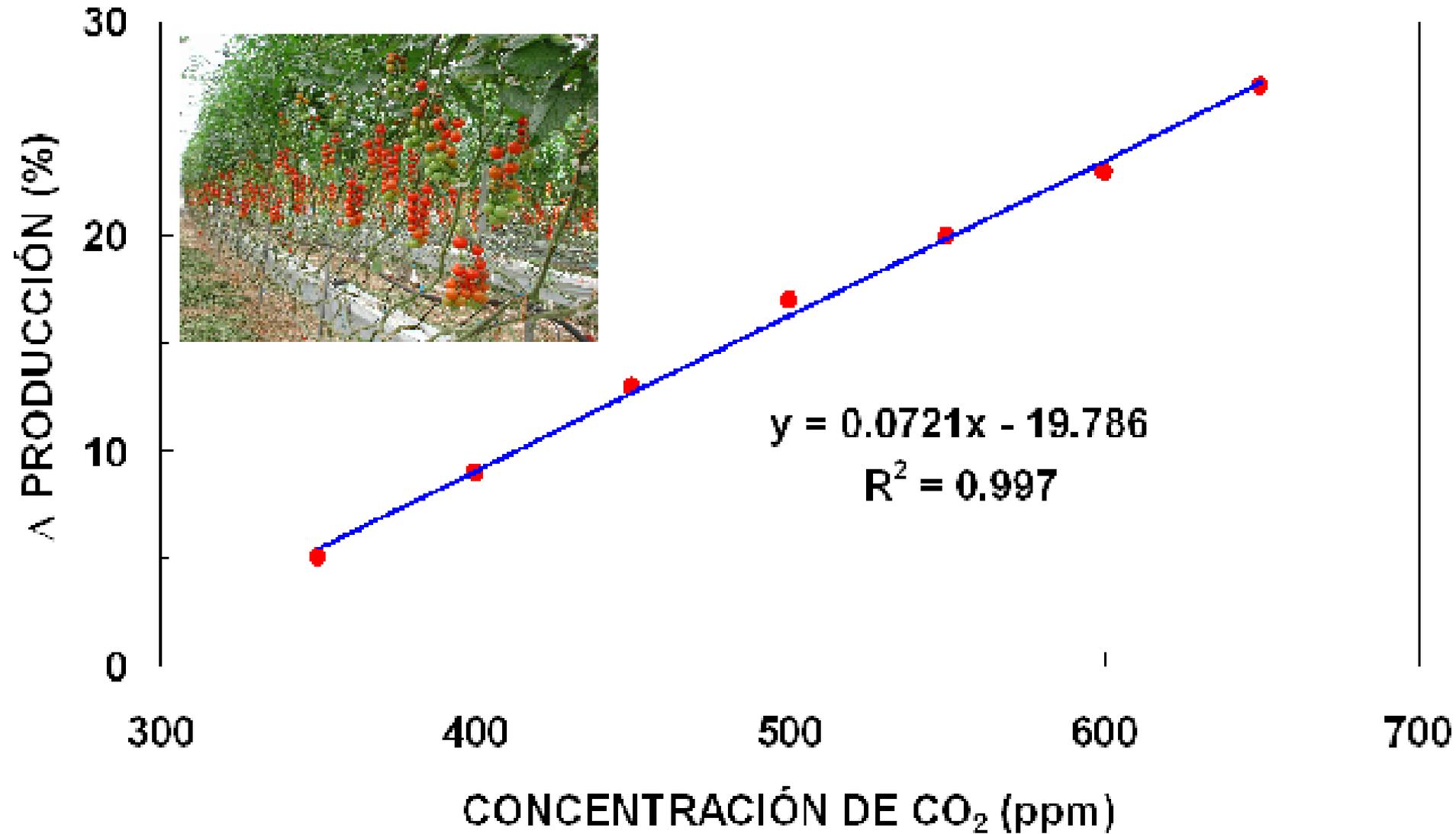
ROSA

CO₂: 1,000 ppm

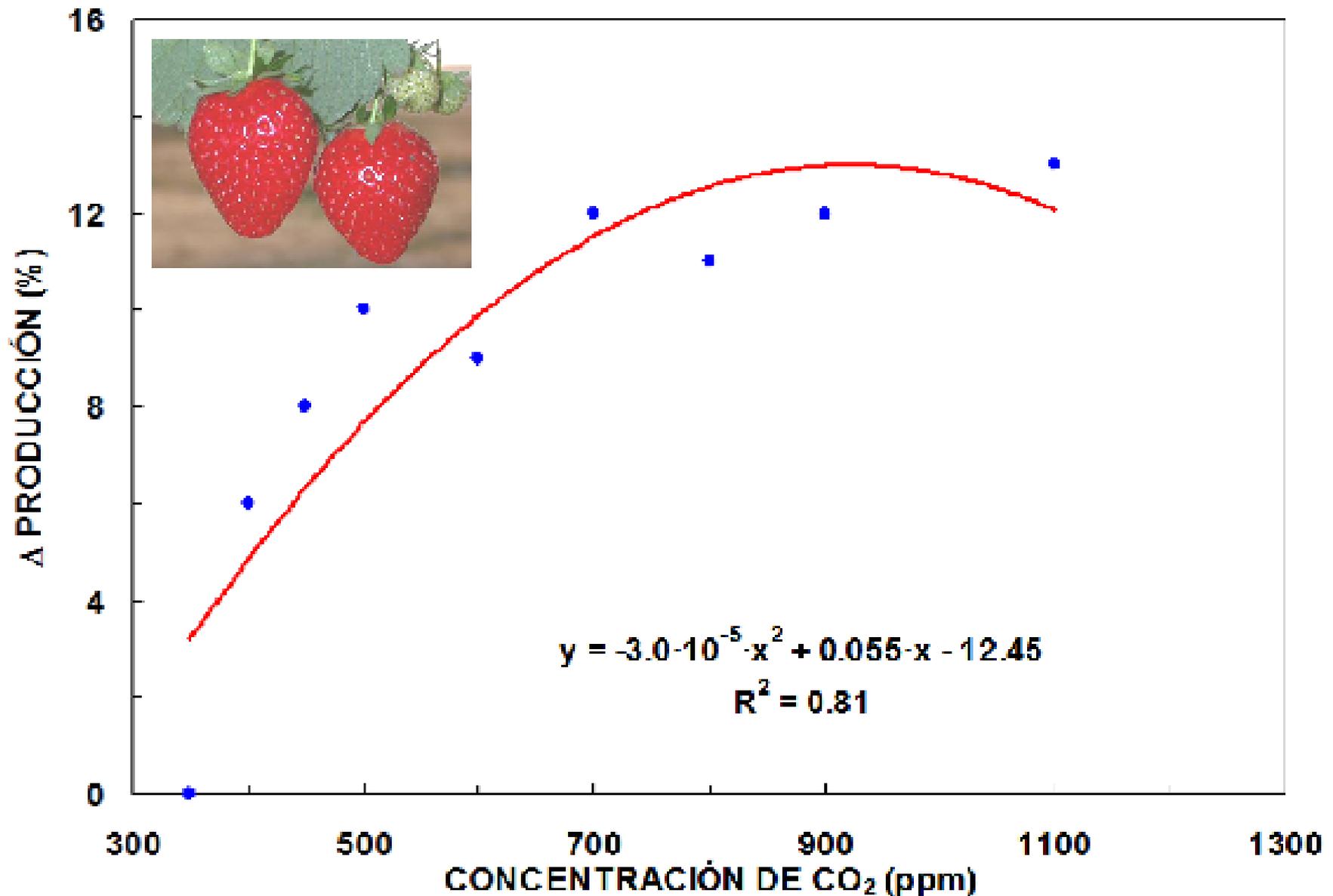
1. Mayor producción
2. Flores más grandes
3. Tallos más largos
4. Más pétalos
5. Mayor precocidad



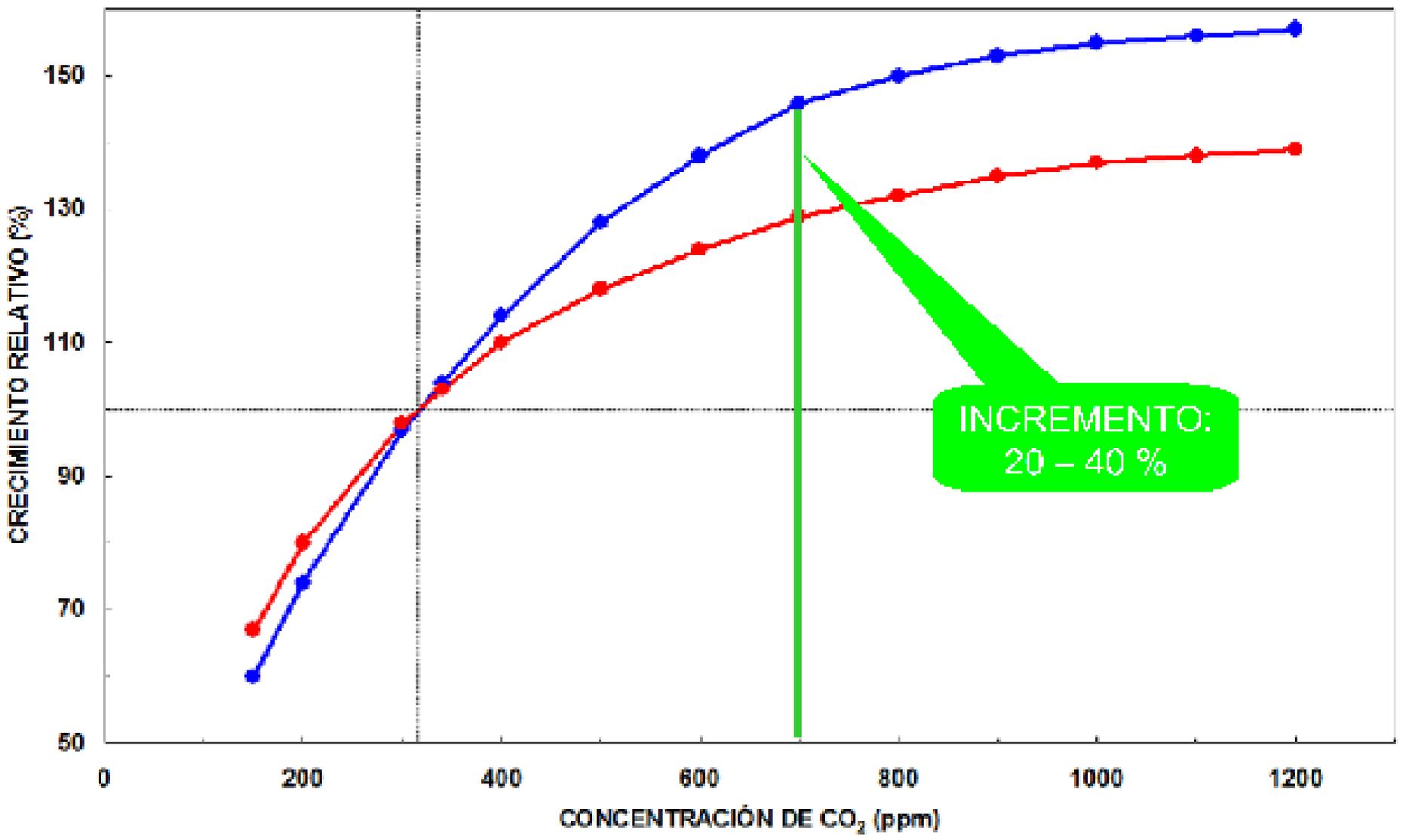
TOMATE + CO₂



FRESÓN + CO₂

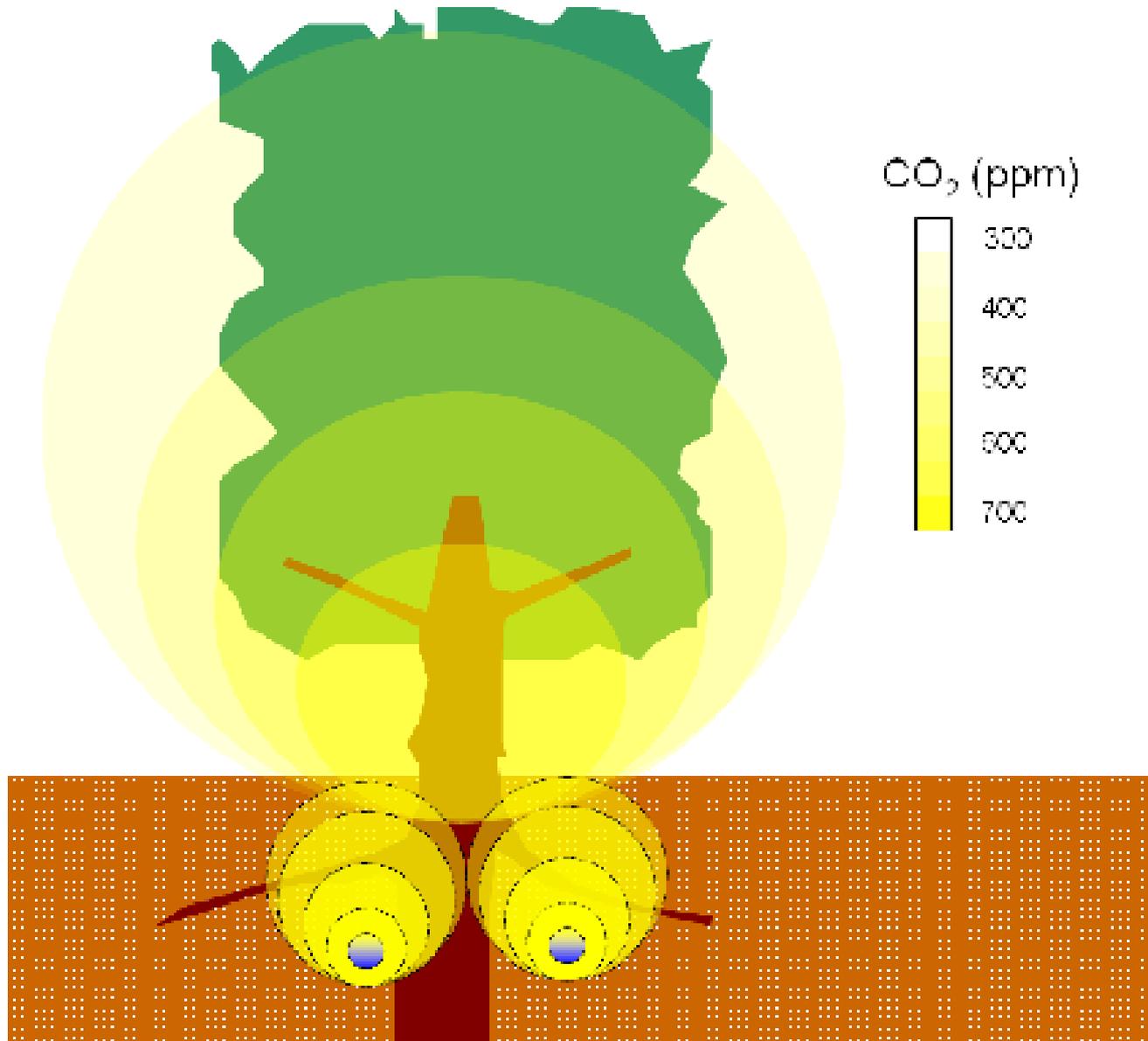


PRODUCCIÓN vs. CO₂



INCREMENTO:
20 - 40 %

“CARBO-FERTIRRIGACIÓN”



FACHADA+ ALGAS

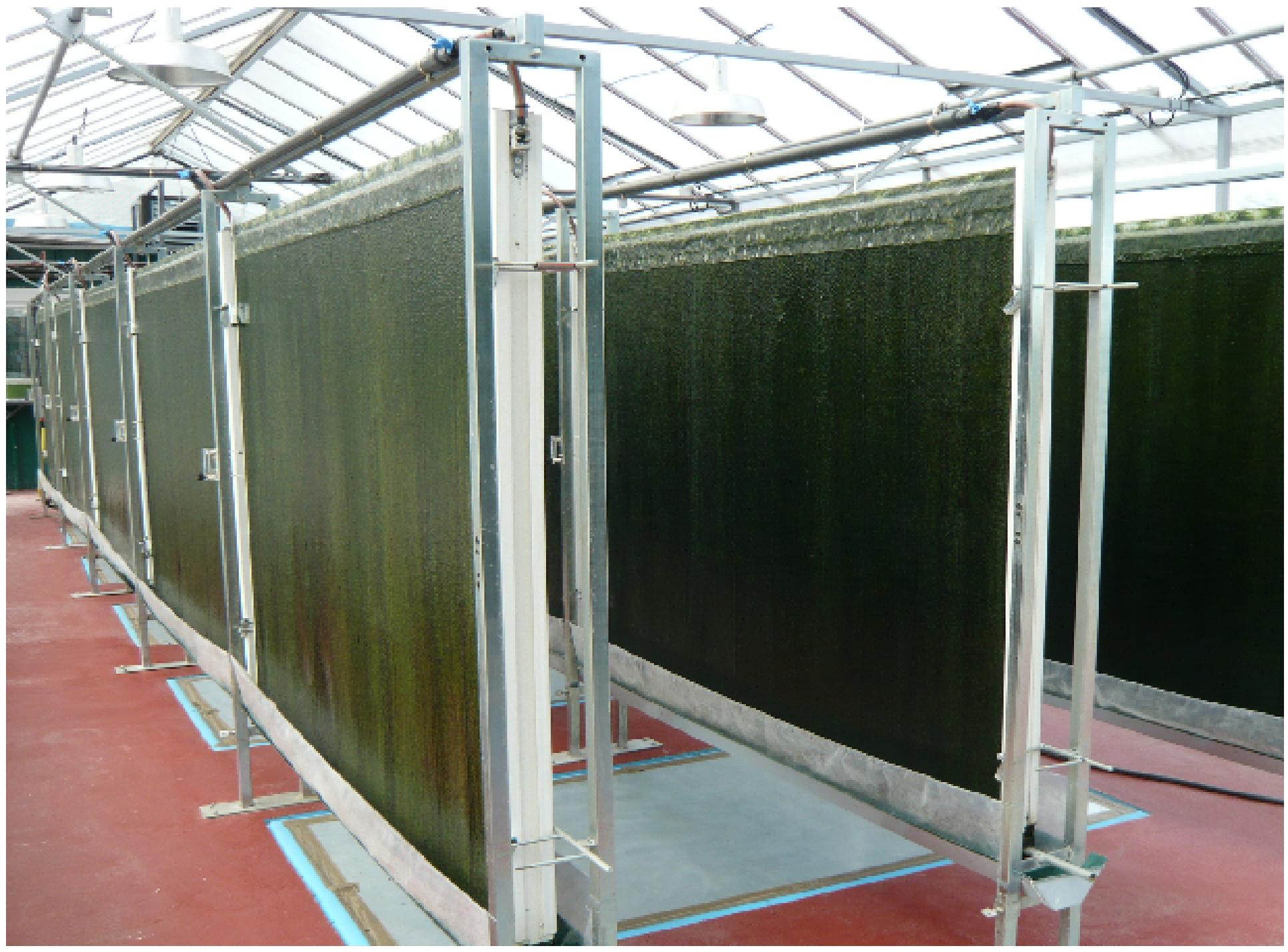


RACEWAYS



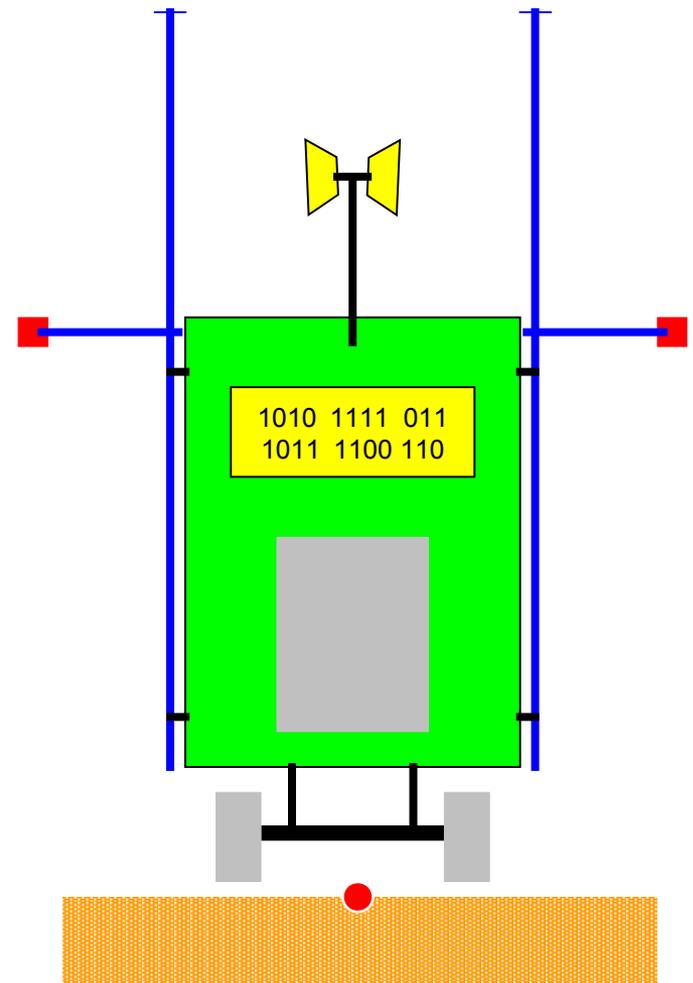
180 x 150 cm²



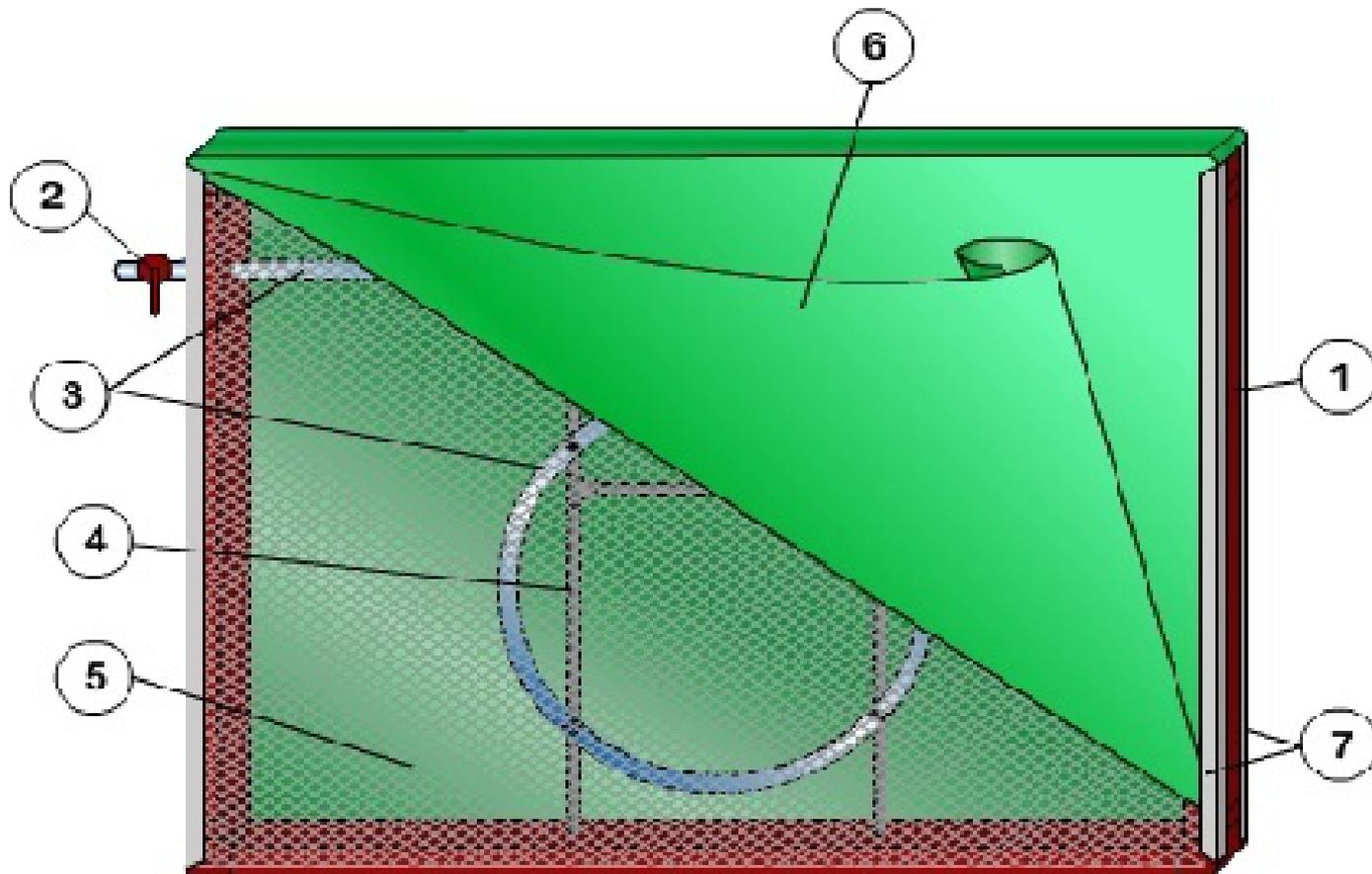




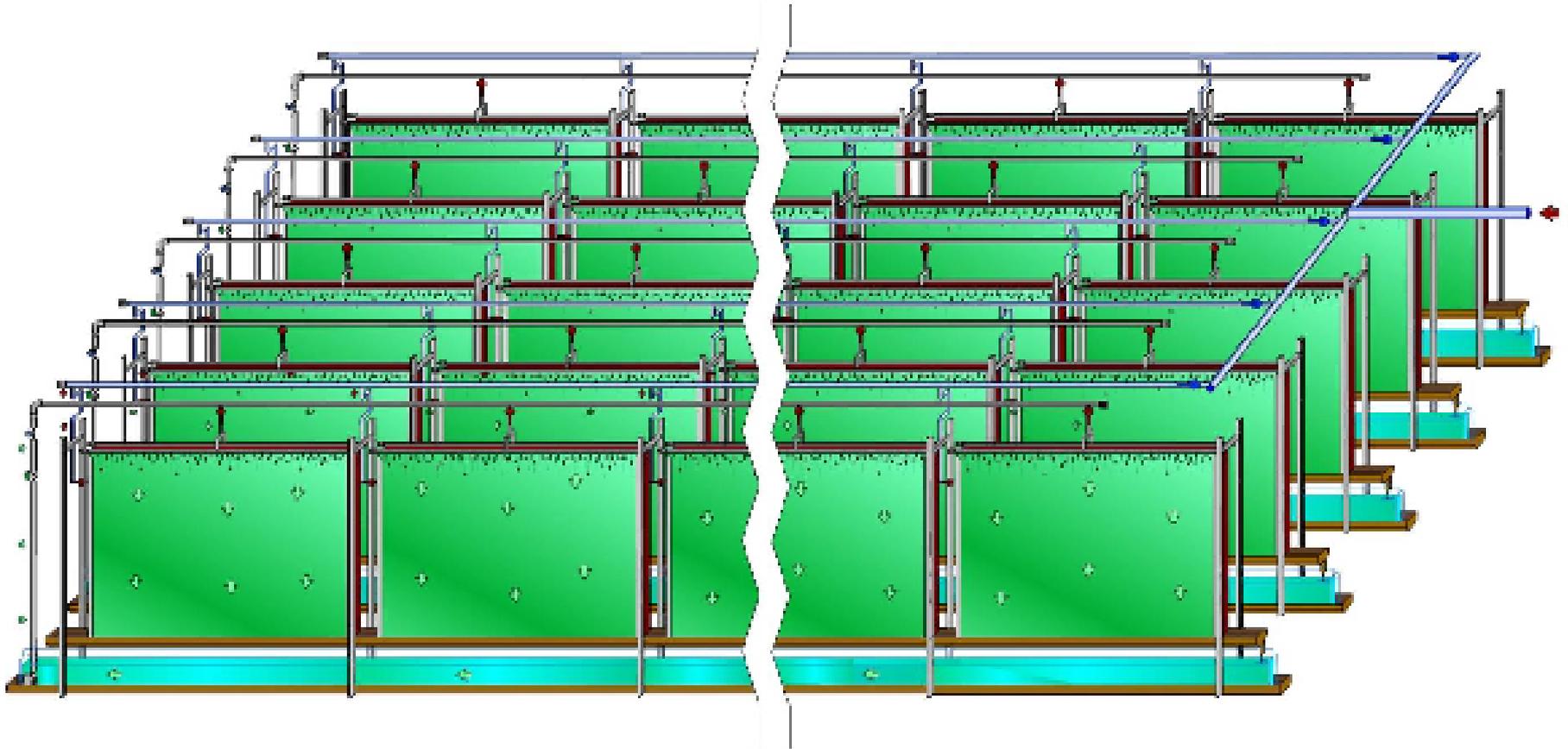
ROBOT



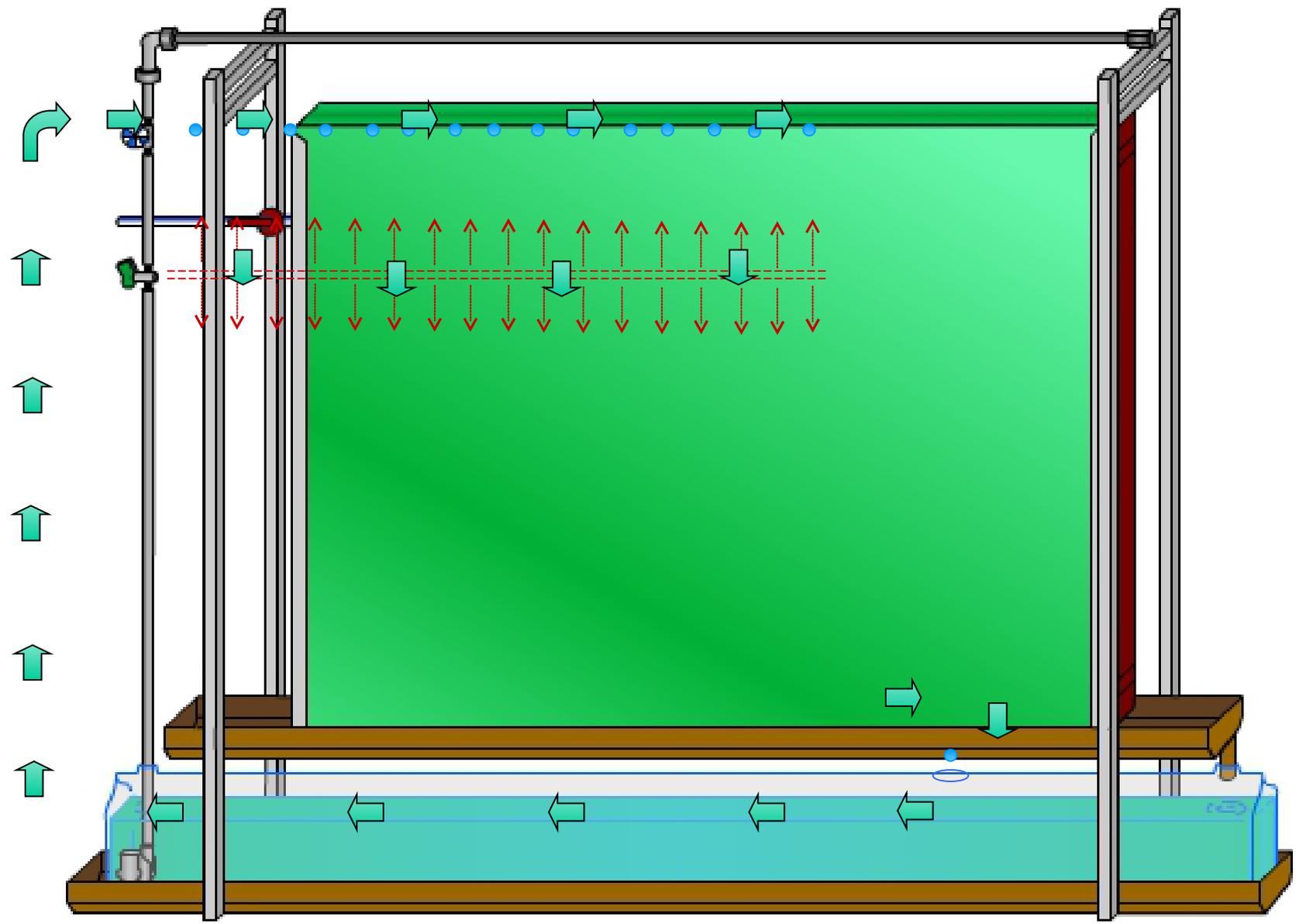
FOTOBIORREACTOR LAMINAR (I)



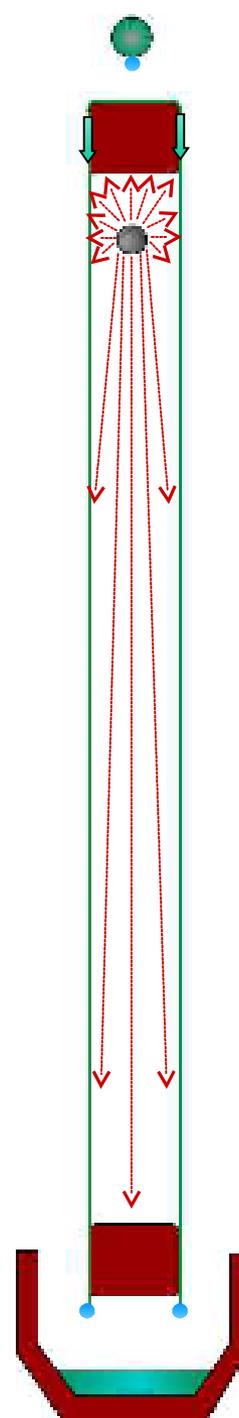
FOTOBIORREACTOR LAMINAR (II)



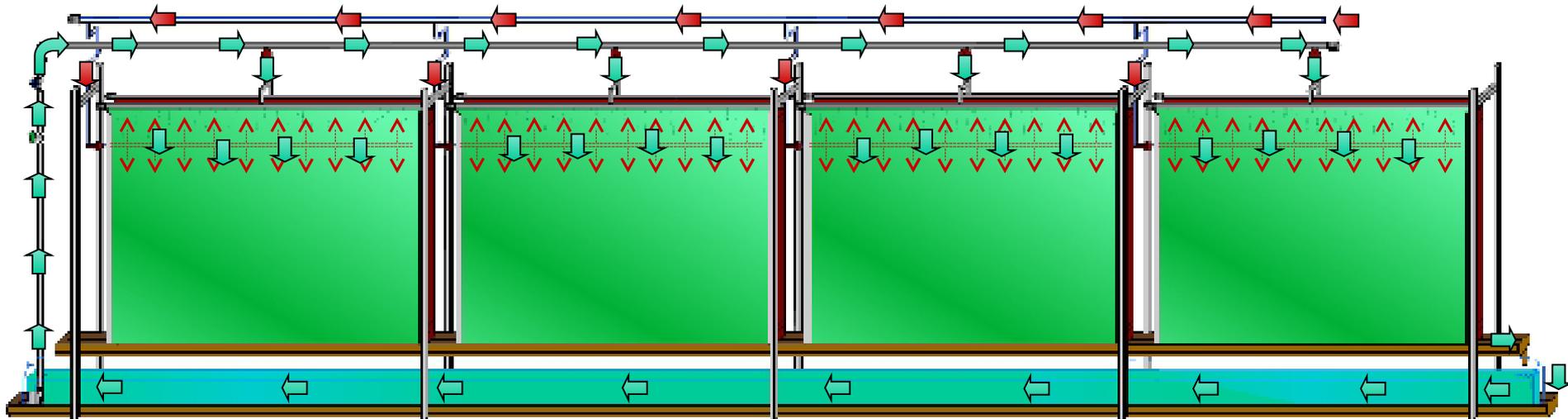
FOTOBIORREACTOR LAMINAR (III)



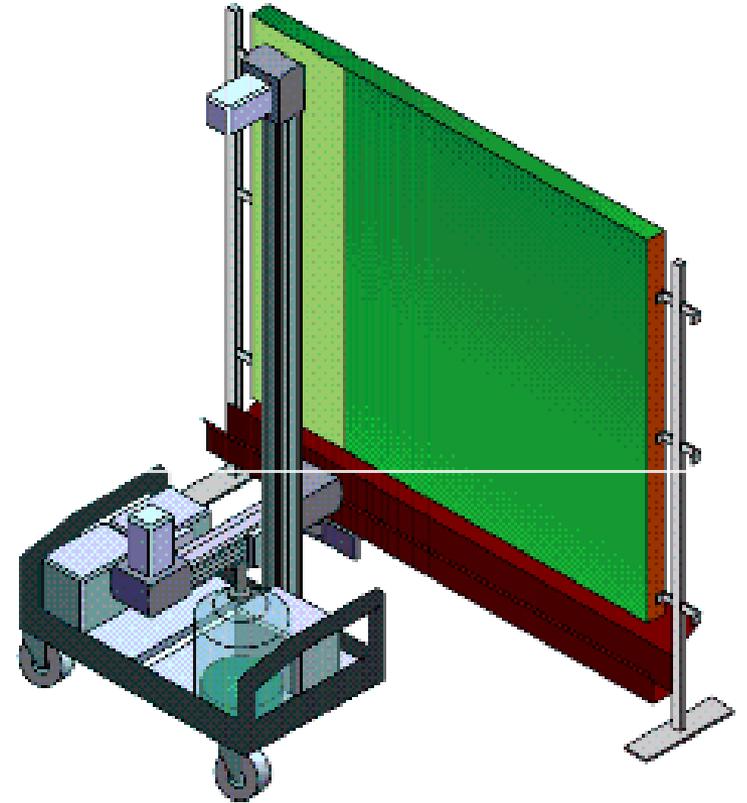
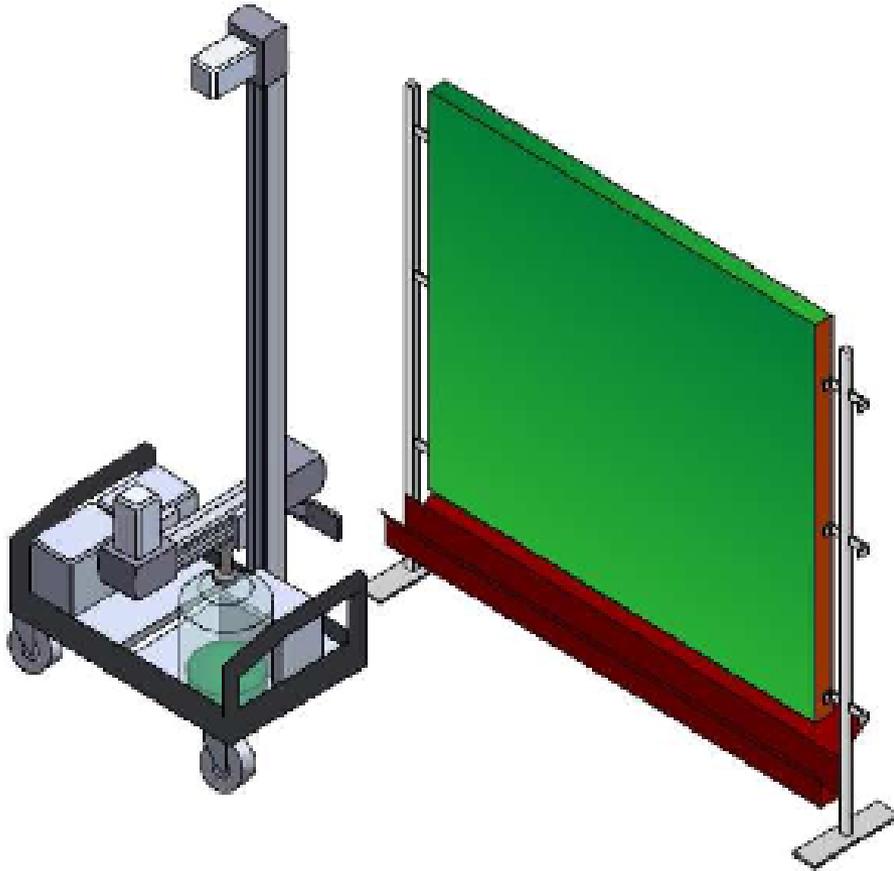
BIORREACTOR LAMINAR (IV)



FOTOBIORREACTOR LAMINAR (V)



ROBÓTICA



ACUMULADOR

15 L

CO₂
10-15 %



ANALIZADOR CO₂



CARACTERÍSTICAS:

Fabricante:	Vaisala (Finlandia)
Modelo:	GM70
Rango:	0 – 20 % CO ₂
Medida:	Difusión / aspiración
Precisión:	± 0.5 %
T (°C):	20 / +60
HR (%):	0 – 100 %
P (hPa):	700 – 1300
F (m·s ⁻¹):	0 – 10
Sondas:	Dos (T / HR)
Datos:	<i>Display / Memoria</i>
Com:	<i>On line USB</i>

GASES COMBUSTIÓN



O_2

CO

CO_2

NO

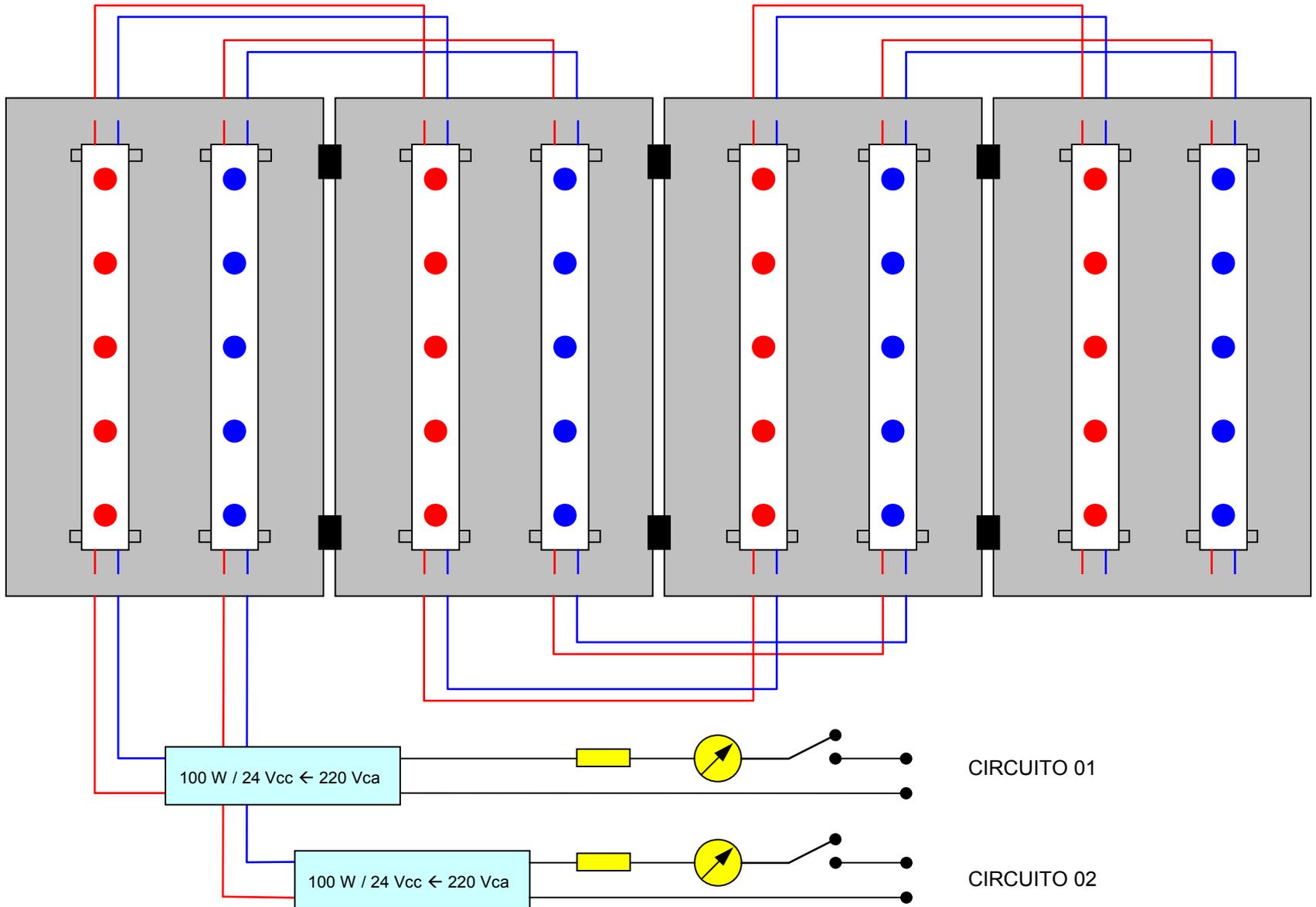
NO_2

NO_x

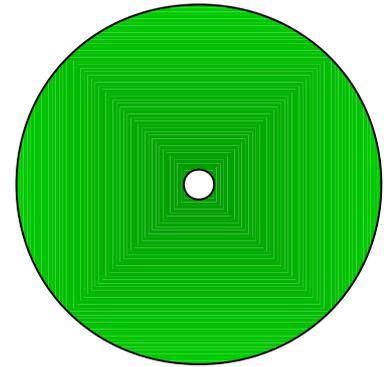
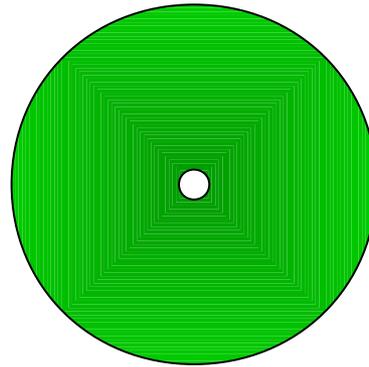
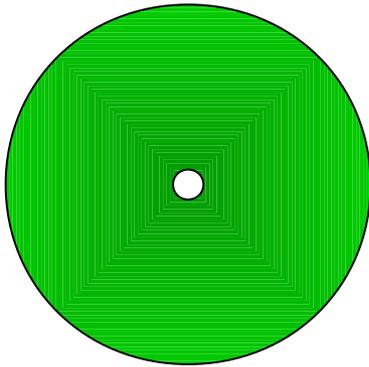
SISTEMA *EDDY COVARIANCE*



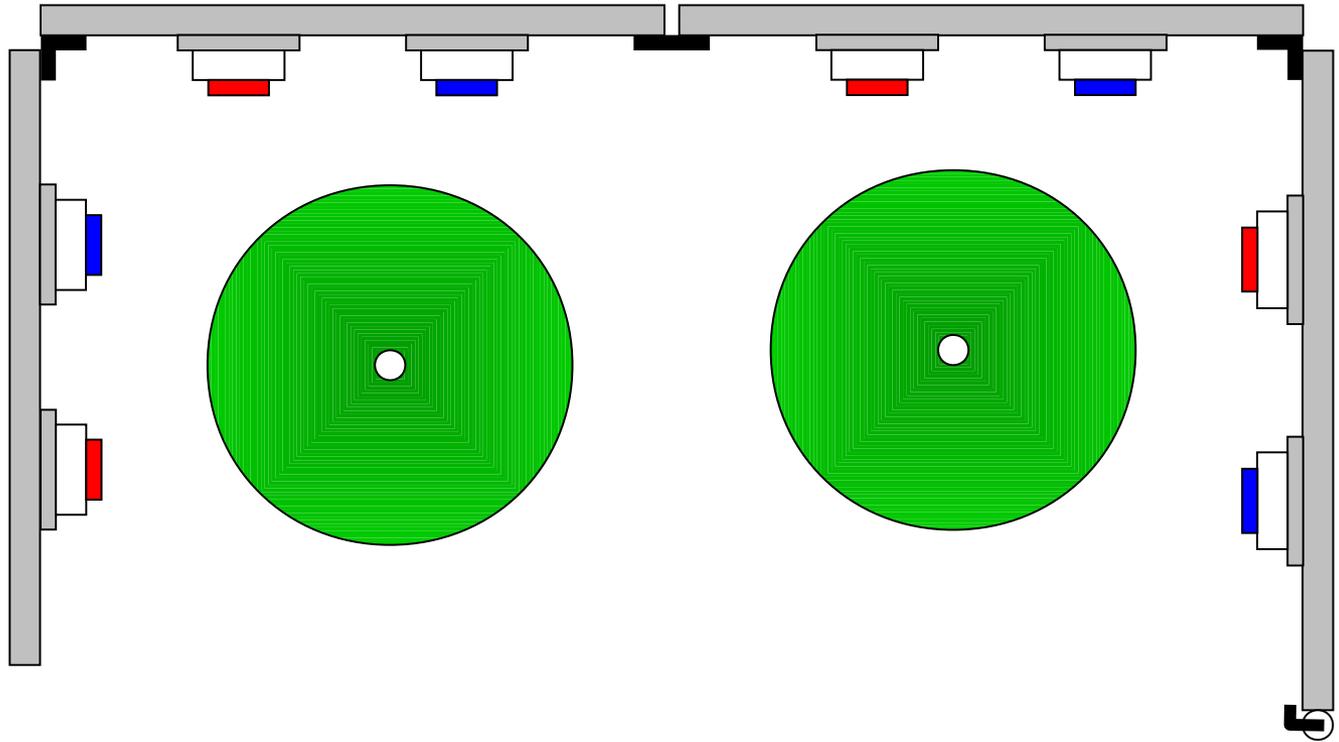
ILUMINACIÓN LED (I)



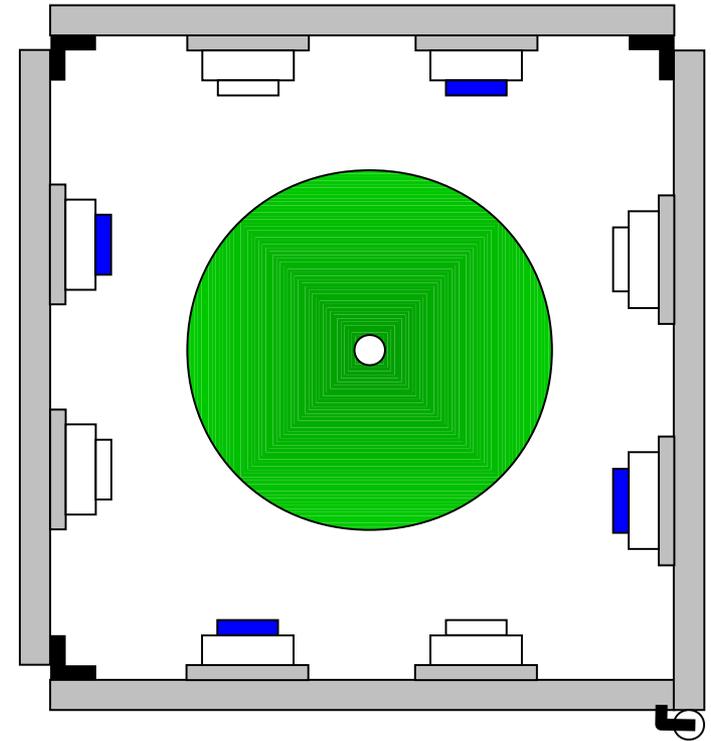
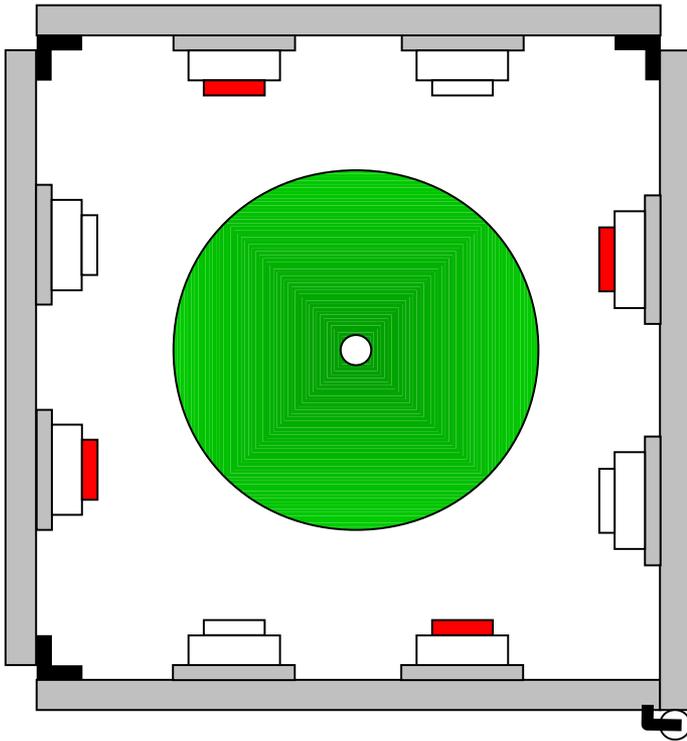
ILUMINACIÓN LED (II)



ILUMINACIÓN LED (III)



ILUMINACIÓN LED (IV)



REPSOL - INSPIRE

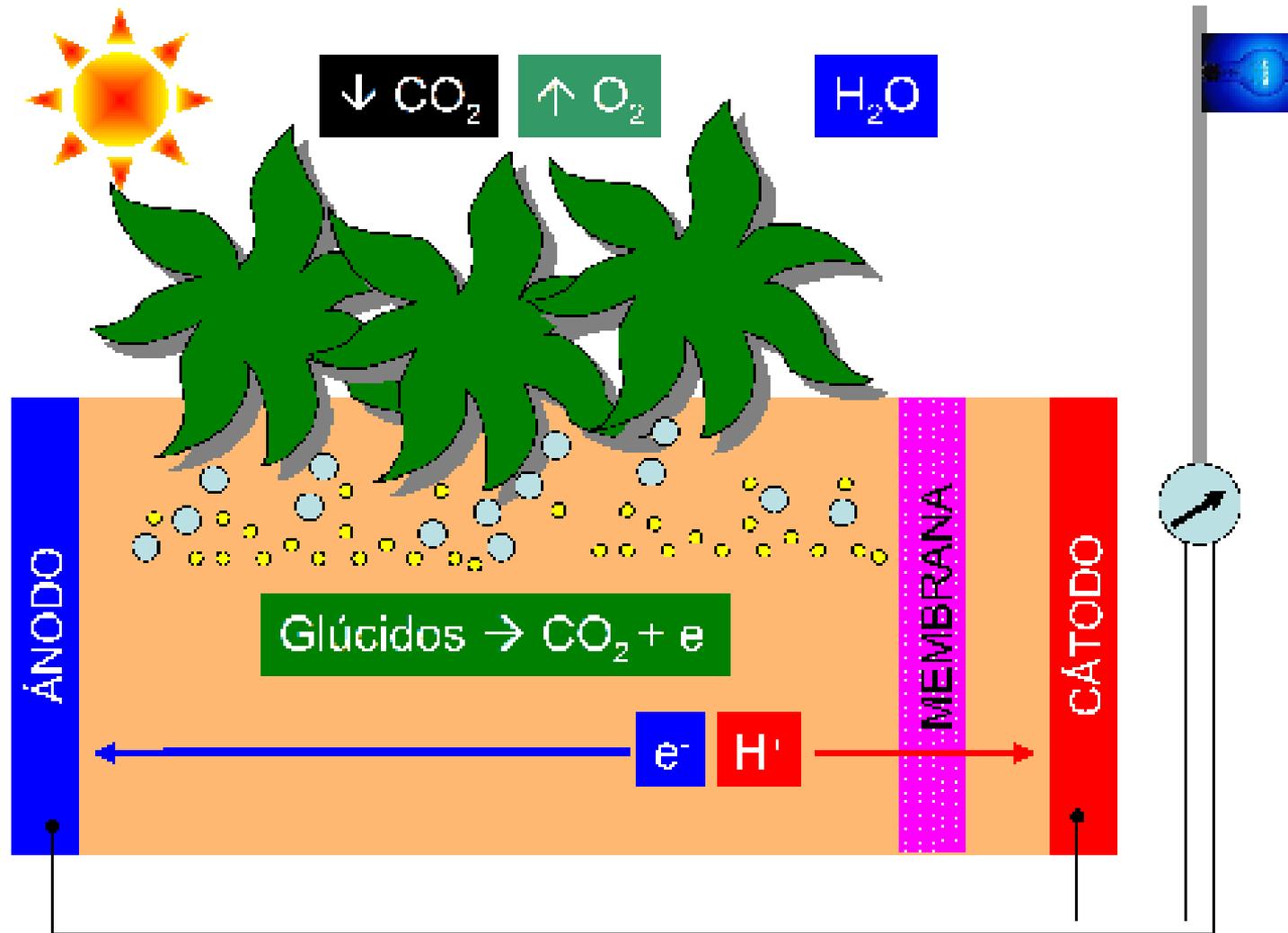
Producción de microalgas para bioqueroseno

ILUMINACIÓN NANOPARTÍCULAS



National Taiwan University (NTU)

7PM: PLANTPOWER™



● Exudados (Glúcidos)

● Microorganismos

CUIDADOS, DISTRIBUCIÓN Y DIFUSIÓN





**¡ Muchas gracias
por su atención !**