

M2M Workshop

Methane capture under the CDM in Latin America
(Kyoto Protocol)

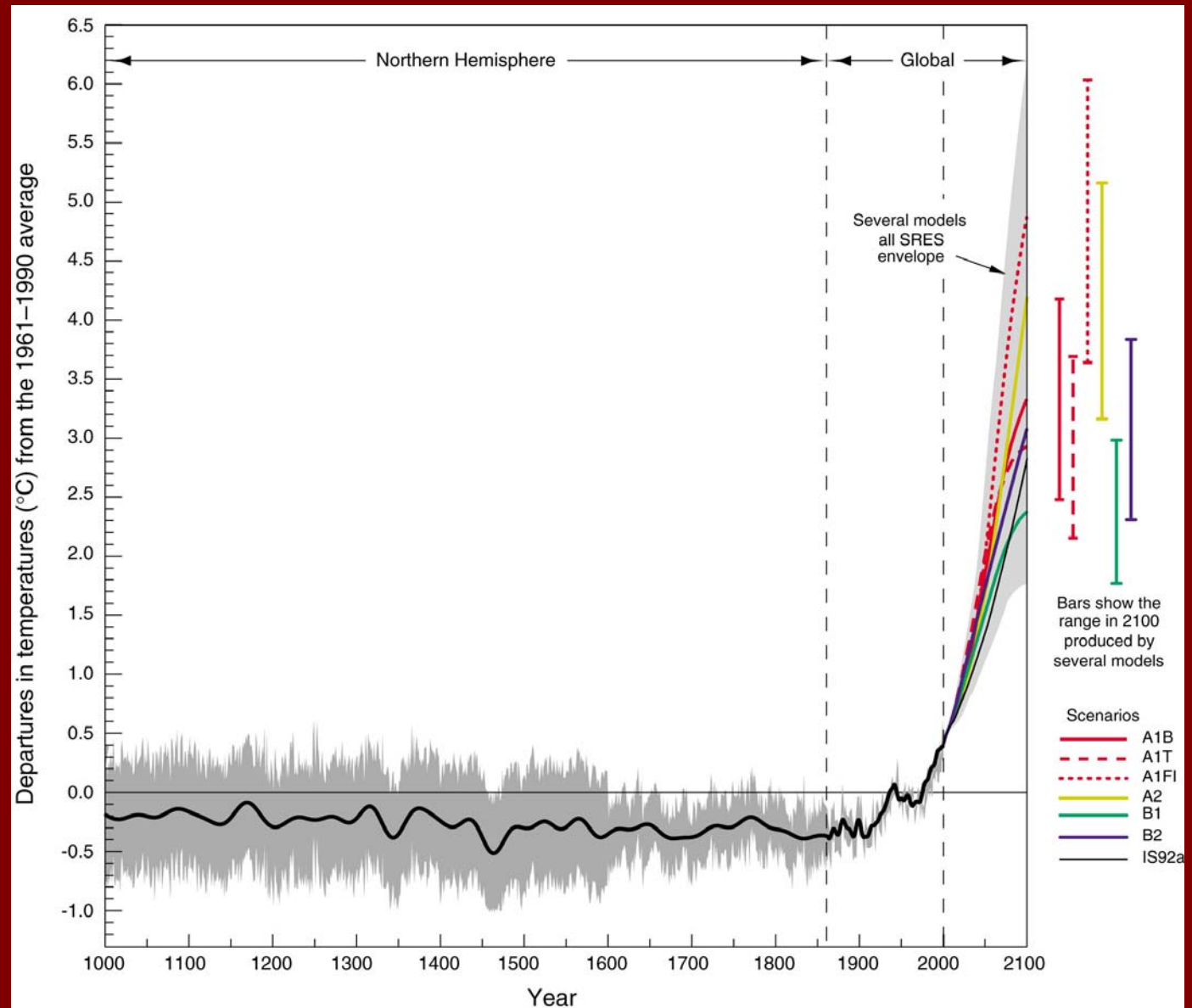
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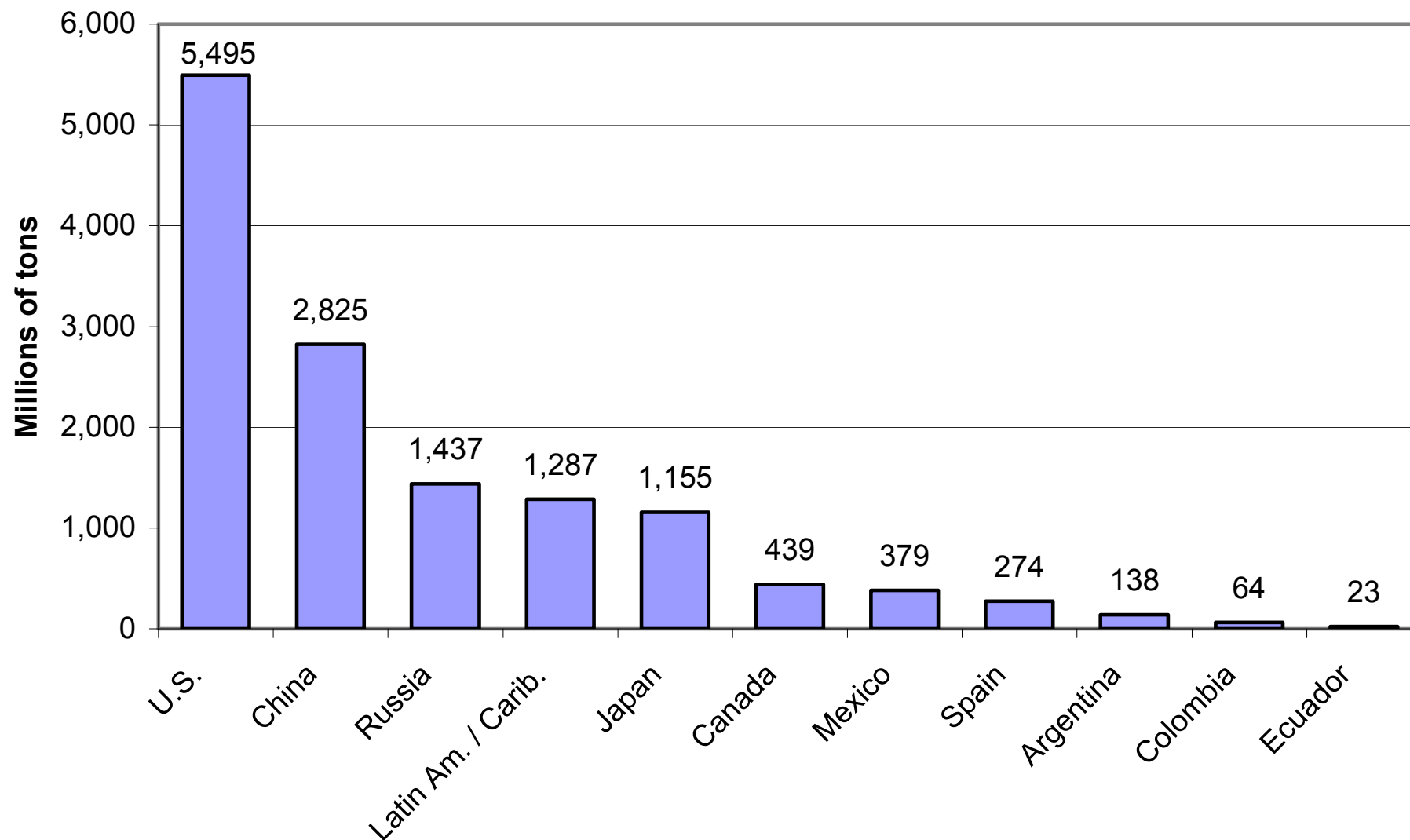
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Variations in the surface temperature of the planet years 1000 a 2100



- 1000 to 1861, N. Hemisphere, proxy data;
- 1861 to 2000 Global, Instrumental;
- 2000 to 2100, SRES projections

Emission of greenhouse gases in 2000



Proposed strategy on Climate Change in LAC

- **Marshall available institutional development resources to strengthen institutional capacity in the region, seeking to empower the region to play an active and influential role in the international climate agenda.**
- **In light of the significant and sometimes irreversible anticipated changes, assign top priority to adaptation efforts**
- **Maximize the value and synergies of carbon revenues by tightening the linkage between these resources and local environmental and social priorities.**

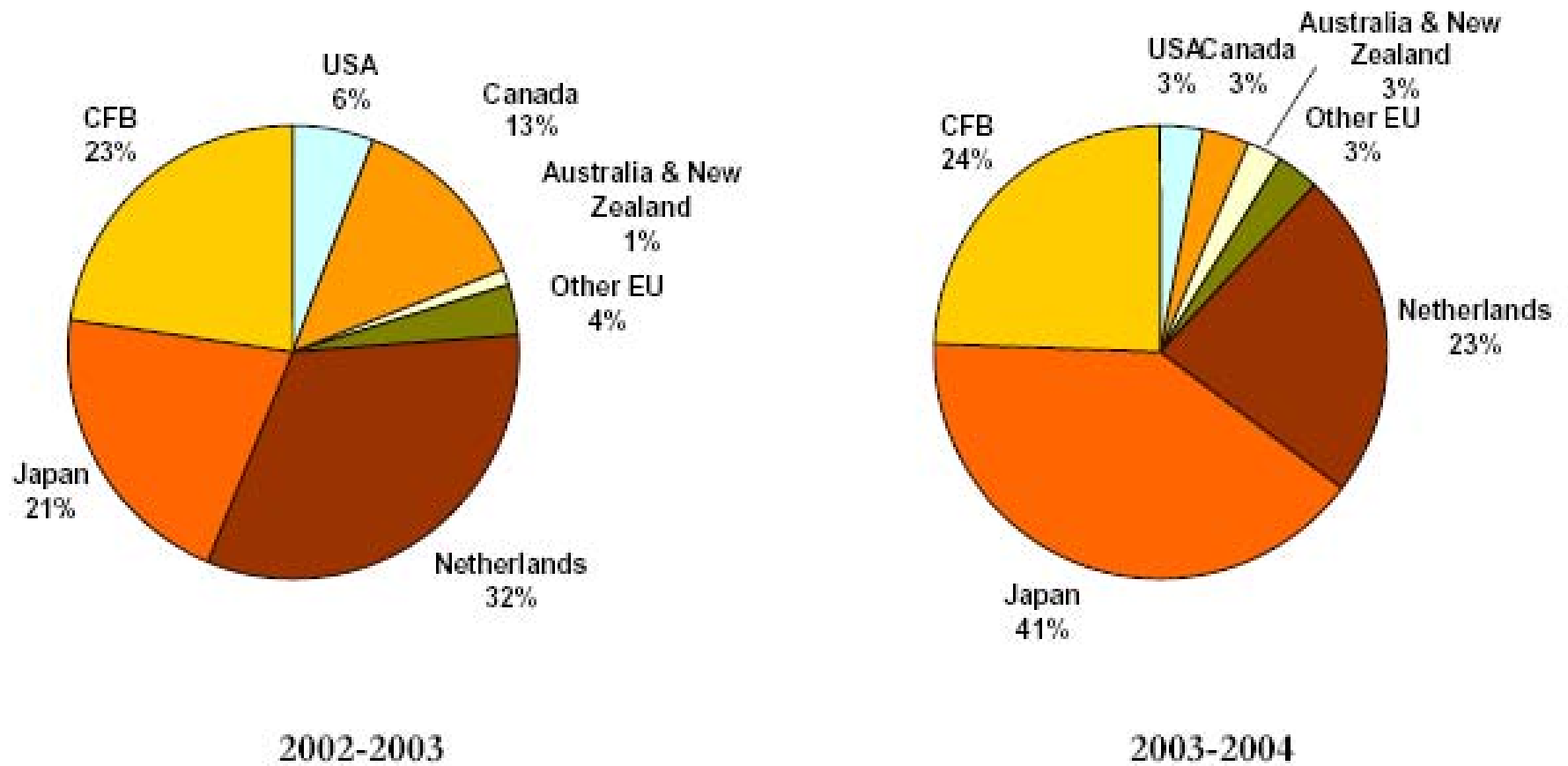
Environment sector

- Local environmental goals, such as cleaner water, air and improvements in solid waste management, can be advanced through CDM-sponsored activities. For example, in:
 - i. Waste-water treatment (sewage sludge and aeration facilities)
 - ii. Solid waste management (landfill gas, composting)
 - iii. Harmonization of air quality improvements
 - iv. Land management (Afforestation)

Carbon finance at the World Bank

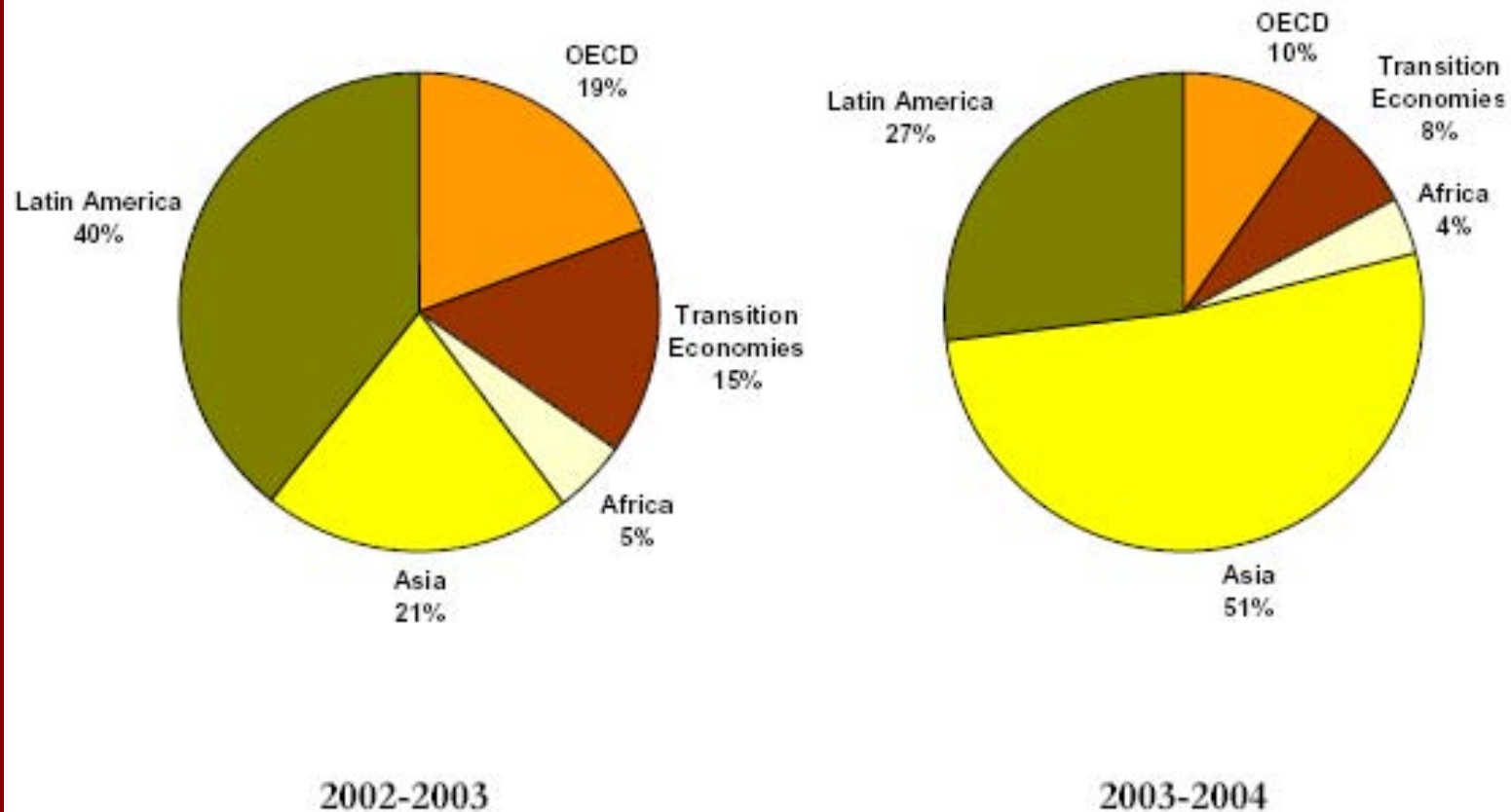
- Prototype carbon fund (fully committed)
- VROM
- Community Development Carbon Fund
- Biocarbon Fund (US\$50M)
- Other European Funds (Italy, Spain)
- Total: US\$1,000 million, projected to increase to US\$1,600 by 2006

Market buyers



Where is the market ?

FIGURE 3: LOCATION OF EMISSION REDUCTION PROJECTS
(in share of volume supplied)

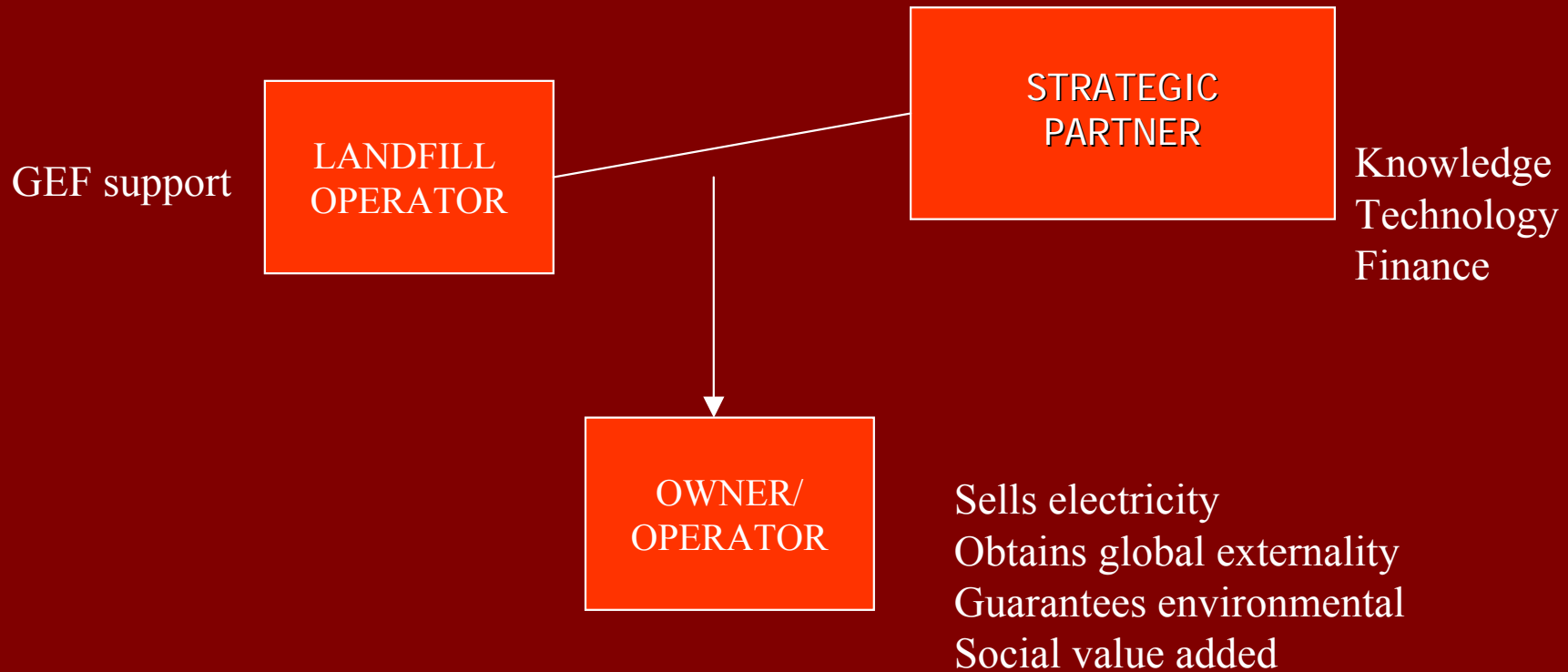


...on landfill gas plants...

(successful record in Latin America)

- GEF-funded Monterrey Plant (Mexico), 7 MW + reforestation program for zero emissions
 - Powers Metro-rey during day
 - Street lighting at night
 - 2 years operation
- Carbon Finance: Three Landfills: Leon (1MWe), Guadalajara (3MW), Monterrey II (5MW):
 - Carbon revenues go into improved integrity of landfills (leachate collection, structural improvements) or community benefits
- Olavarria (Argentina) CDCF flaring, Uruguay Maldonado 1MW

Institutional Structure



Institutional set-up

- Strategic partner was selected through ICB process (17 submissions, 5 short listed) judged at highest NPV
- Awarded to consortium (UK, Costa Rica, Mexico companies): Bio-electrica de Monterrey
- Both formed Bio-energia de Nuevo Leon, owner of the plant (BENLESA)
- Minor investors: Municipalities and public service companies (Metro, water utility)

Sizing of Plant

- Gas generation model, adjusted for local conditions
- Testing wells to confirm potential
- Characterization of gas in situ
- Conservative assumptions for collection efficiency and power generation

Total cost: US\$ 11.5 m

GEF: US\$ 4.9 m

EP: US\$ 6.6 m

Installed cap. : 7 MW

CO2 abated: 1.0 m tCO2 (e)

Location: Sanitary landfill in Victoria Salinas



Demand

- **Under Mexico's law, private companies can co-generate or produce for internal use**
- **Power output:**
 - **City of Monterrey for street lighting (10.4 MW at night)**
 - **Metro of Monterrey (Metrorey, 6MW, mostly during the day)**
 - **Water Utility (8 MW constant)**
 - **SIMPEPRODE (1 MW mostly daytime)**

Legal structure

- **Cogeneration permit (issued by CRE)**
- **Agreement for energy supply: Bio-energía-Metro-rey, Monterrey Municipality, Water Utility**
- **Landfill gas supply, land lease: SIMEPRODE-Bioenergía**
- **Contract for turn key: SIMEPRODE-Bioeléctrica**



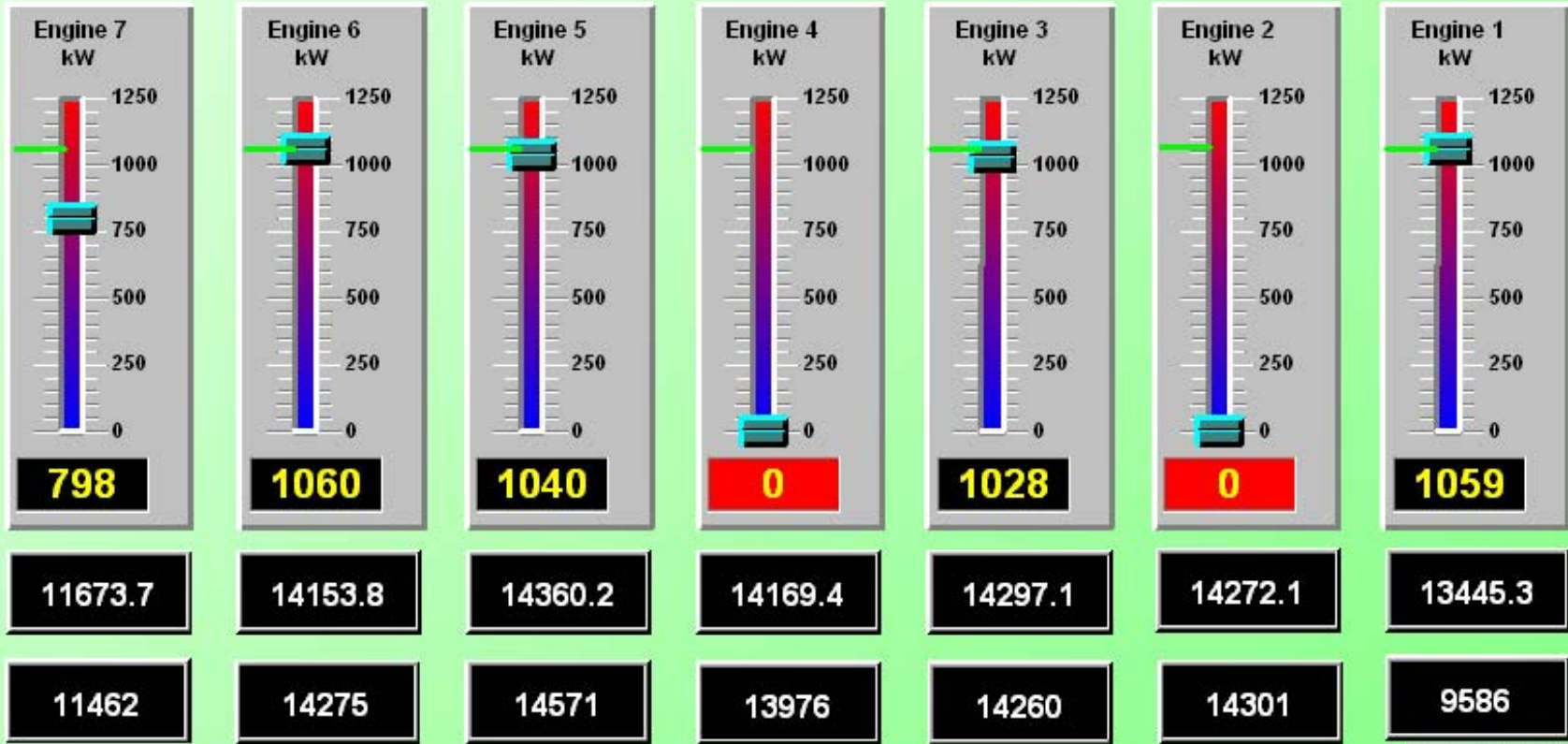
JENBACHER
Energy Tech



Consumo total de Metano
21201.8 TM

Equivalencia en Reducción de Emisiones CO2
382894.0 TM

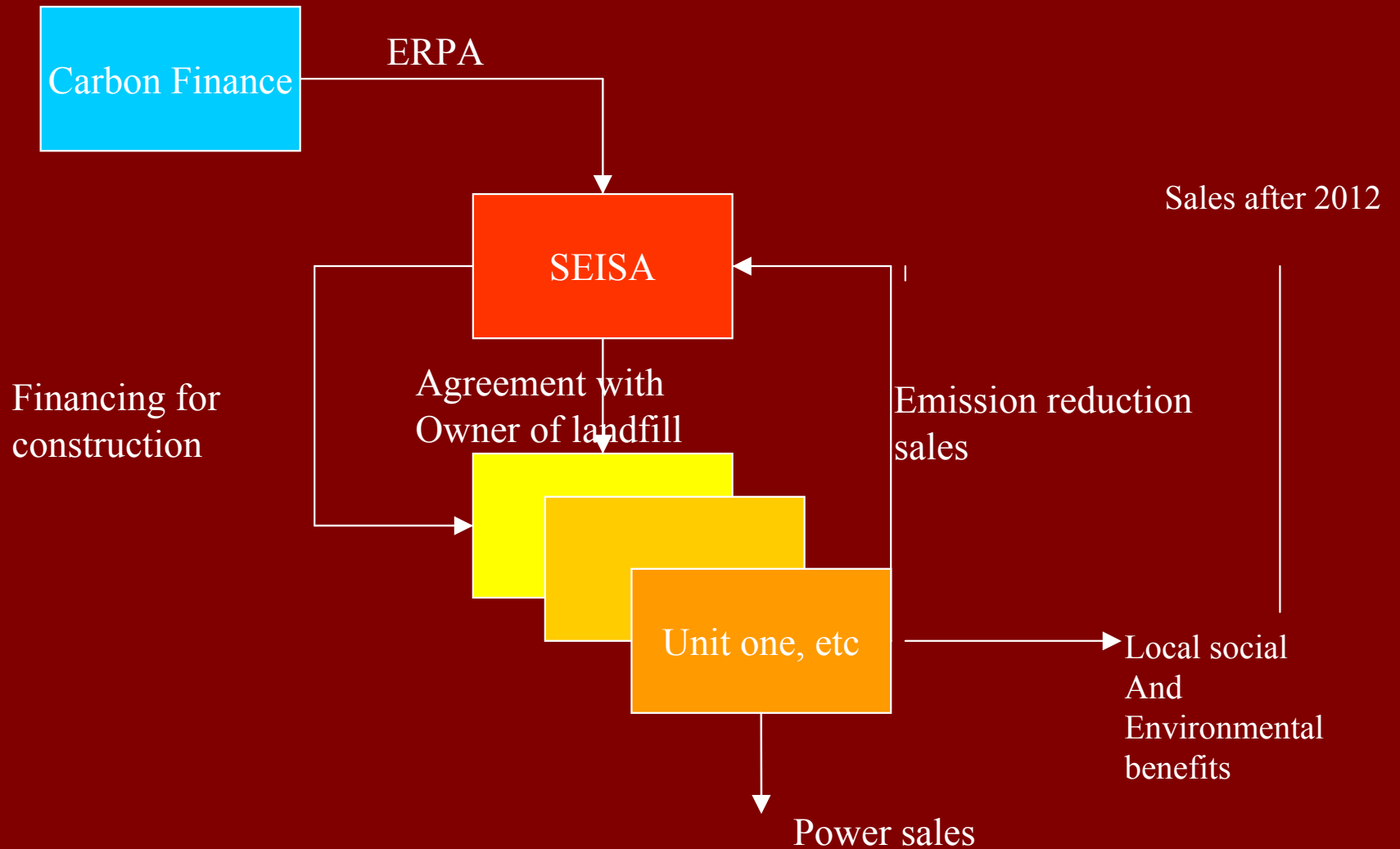
Total de MWh Generados
96371.6



Monterrey is a success

- Demonstrates concept
- Partnership between financier (Mexico), know how (UK), management expertise (Costa Rica)
- Basis for replication elsewhere in the region
- Energy-waste management-climate change

Financial structure multi-landfill operation in Mexico



Composting

- Prevents formation of Methane at landfills
- Quick return on investment once ER revenues are factored in
- Methodology in process of approval at CDM Board
- Proposed multi-plant composting project in Mexico
 - ER sales
 - Reduction of tipping fees
 - Soil conditioner

CH₄ and N₂O from wastewater treatment

- Wastewater important source of CH₄
- N₂O is also major concern (310 gwp)
- Only 9% of sewage is treated in the region
- ER revenues can improve economic performance of WWT

Rio Frio Wastewater treatment Plant Project Objective

- Reduce greenhouse gas emissions from the wastewater treatment sector in Colombia through the modernization of the Río Frío wastewater treatment plant, located in Girón (metropolitan area of Bucaramanga), Colombia.
- 15% of carbon revenues will support a community benefits program.

Strategic value

- The project would constitute a 'proof of concept' with potential to be replicated throughout the region: demonstrate CDM application for CH₄ (21) and N₂O (310) in wastewater treatment.
- Project would improve viability of secondary wastewater treatment (only 10% of wastewater is treated in LAC)
- Project preparation includes techniques for field measurements of N₂O

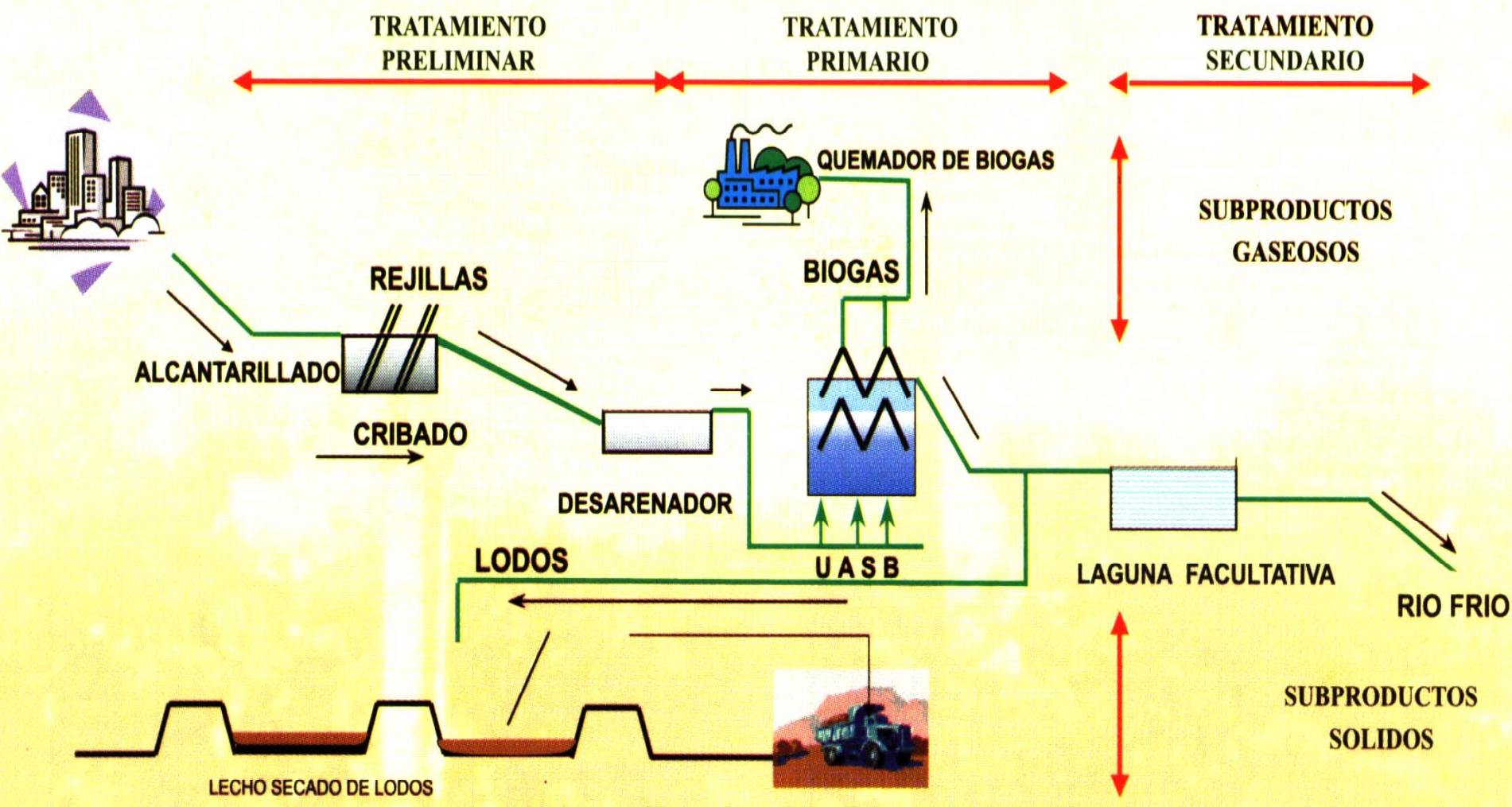


Figure 1 Esquema de proceso en la PTAR, Río Frío Area Metropolitana de Bucaramanga (Colombia)

Activities

- **GHG abatement at the waste water treatment plant.** Improvements that will result in elimination or prevention of GHG emissions (CH₄, N₂O)
- **Social program to** address overall health conditions (including STD and HIV/AIDS), and employment among poor segments of local population

Project Parameters

- Target population: 0.5 million
- Effluent: 90,000 tons/day
- BOD i-o 350 ppm-35 ppm
- [Ntotal] i-o 50 ppm-20 ppm
- Biogas generated and captively used 15,000 m³/day
- Aeration power rqmts 1.5 MWH
- Sludge (biosolid) 13 tons (dry)/day

How to reduce CH₄ emissions

- Improved collection in the UASB (cut fugitive emissions and leaks, better degassing)
- Eliminate emission from facultative lagoons
- All CH₄ burned to provide mechanical energy

Source of reduction of N₂O

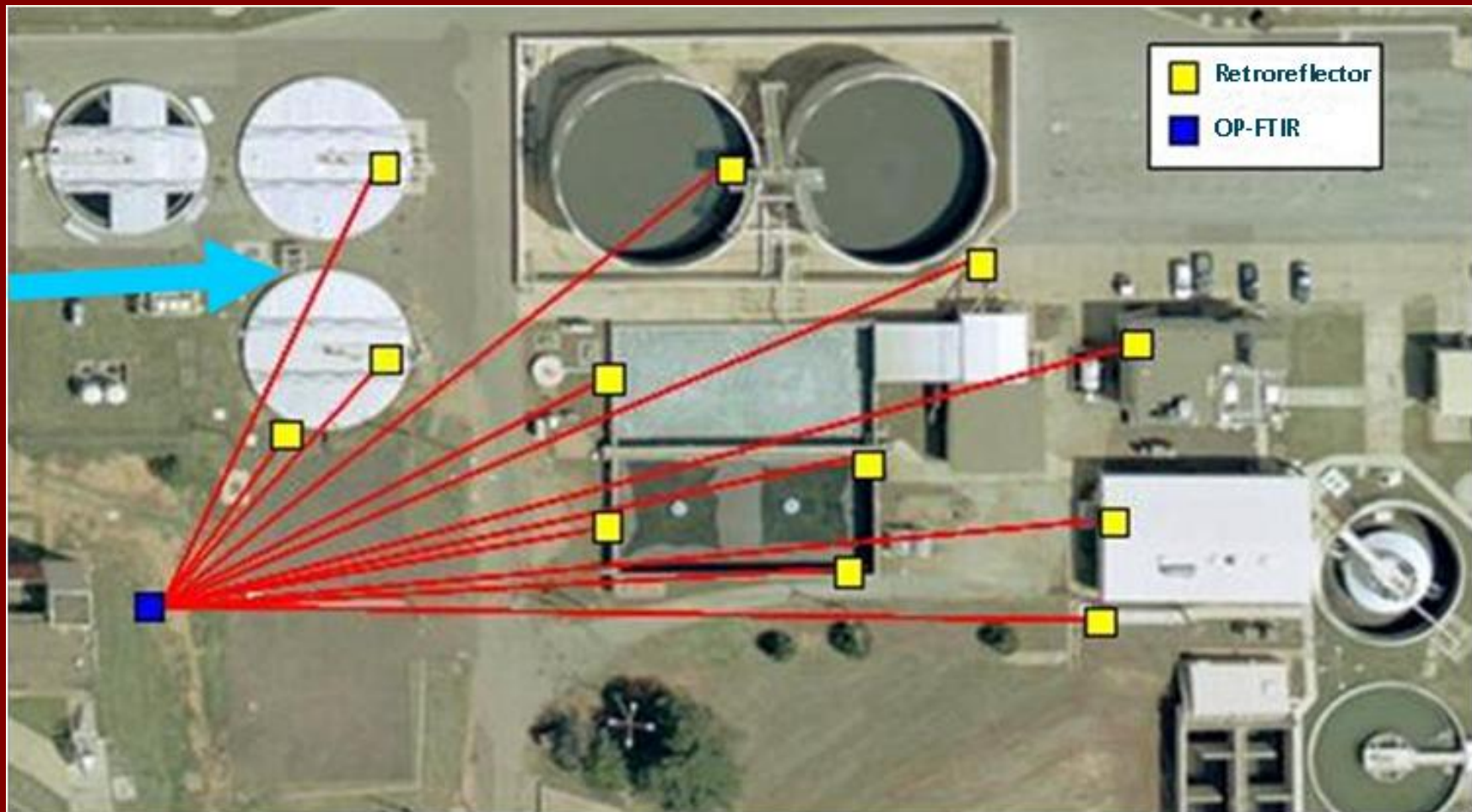
- NH₄ released in effluent may result in N₂O emissions through two pathways, as a byproduct of nitrification and denitrification
- IPCC has recognized these emissions and identified a range of between 0.01-0.12 N in N₂O/N in N (org)
- Default factor severely undervalued (0.01)

Project Cost

● Pre-treatment	10%
● UASB	20%
● Anoxic/Aerator hybrid	25%
● Clarifiers	15%
● Sludge treatment	10%
● Others	20%
● Total	13 US Million
● Cost per hab.	26 US

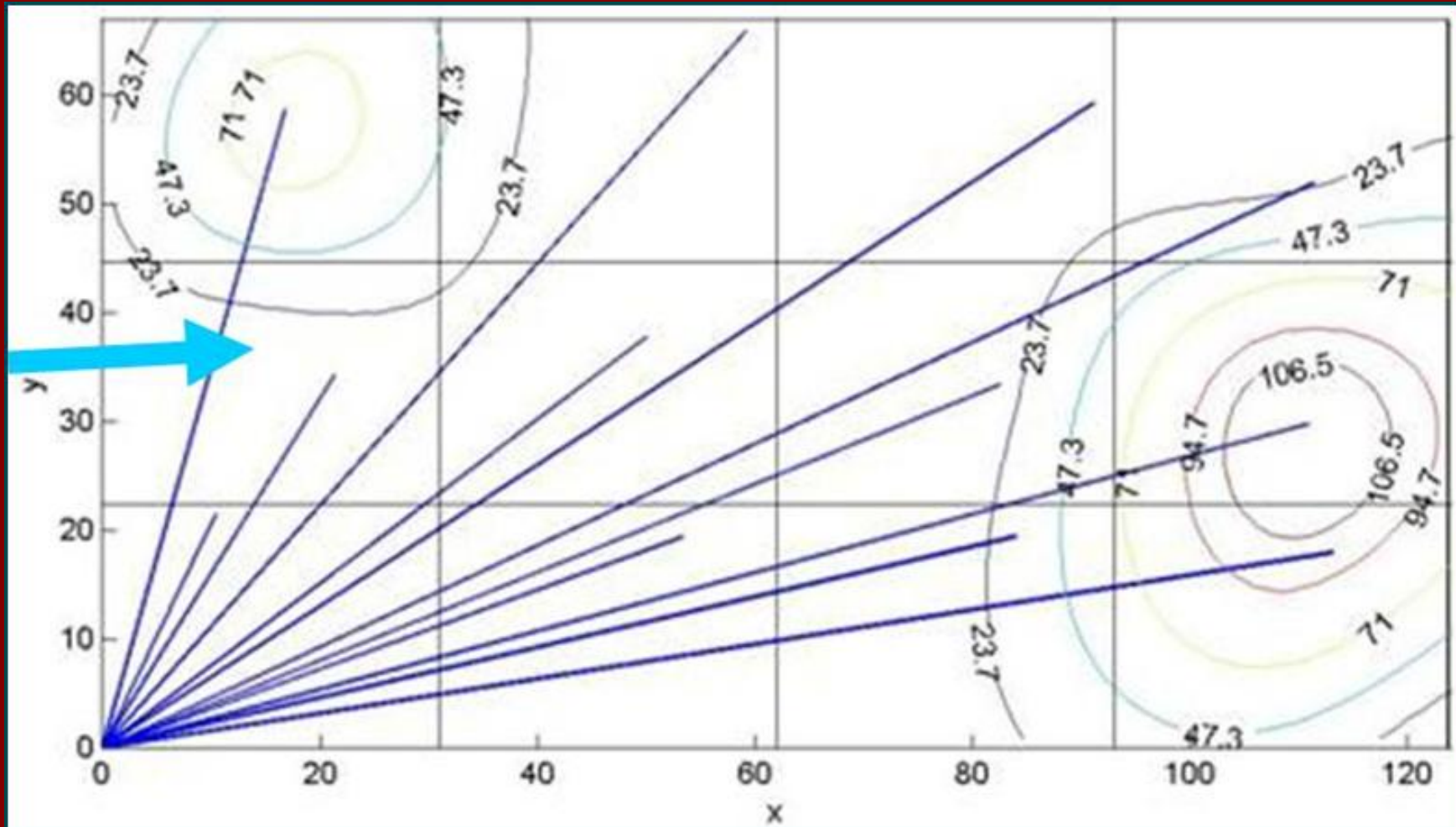
Optical Remote Sensing

Example HRPM Configuration



Optical Remote Sensing

HRPM Surface Concentration Map





Recommendation of Measurement Tech.



FTIR

Merit

- Large areas
- Continuous Monitoring

Demerit

- Many Influence Factors



Chamber

Merit

- High Accuracy

Demerit

- Local measurement



Combined use
is effective.

Emission reductions

- CH4 35 Kton CO2e/y
- N2O 15 Kton CO2e/y
- Other revenues: Land valorization, income from improved quality of effluent
- IRR NPV MM\$
- Baseline 11% 0.6
- CDM 21% 2.5
- ERPA Negotiated
- PDD & NBM & NMM 4Q 2005

Energy and CDM

- Renewables
 - Wind, geothermal, solar
- Energy efficiency
- Gas venting and fugitive emissions at refineries
- Transport of fuel products
- CO₂ recovery