ATHENS 2017 5th International Conference on Sustainable Waste Management, June 23, 2017

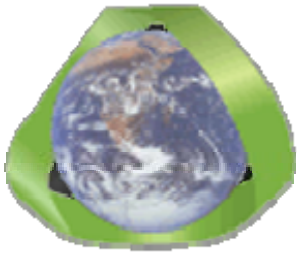
The Perfect Time for Greece to join Modern MSW management

Prof. Nickolas J. Themelis, Director

COLUMBIA UNIVERSITY

EARTH ENGINEERING CENTER

Chair, Global WtERT Council (GWC)

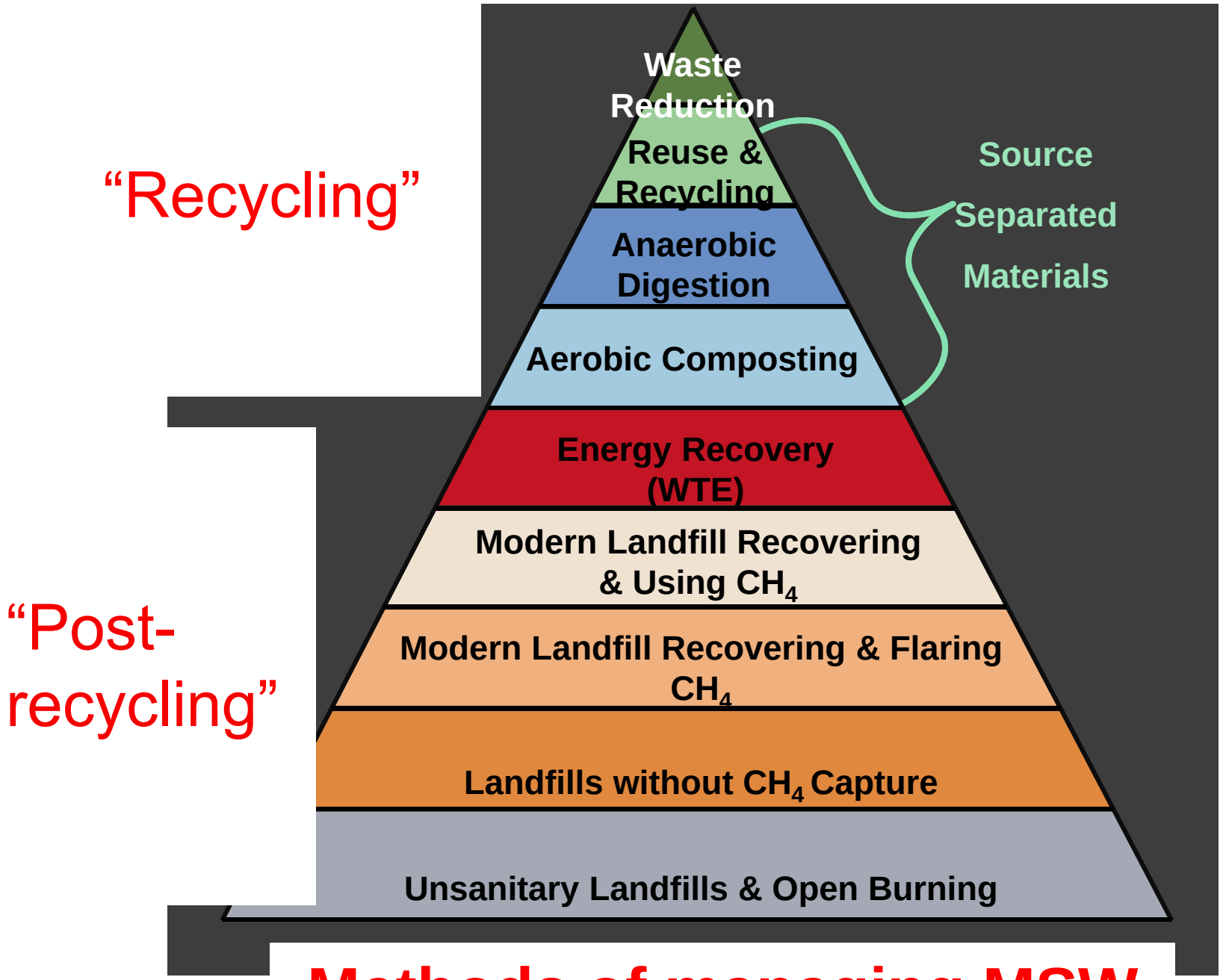


Order of presentation

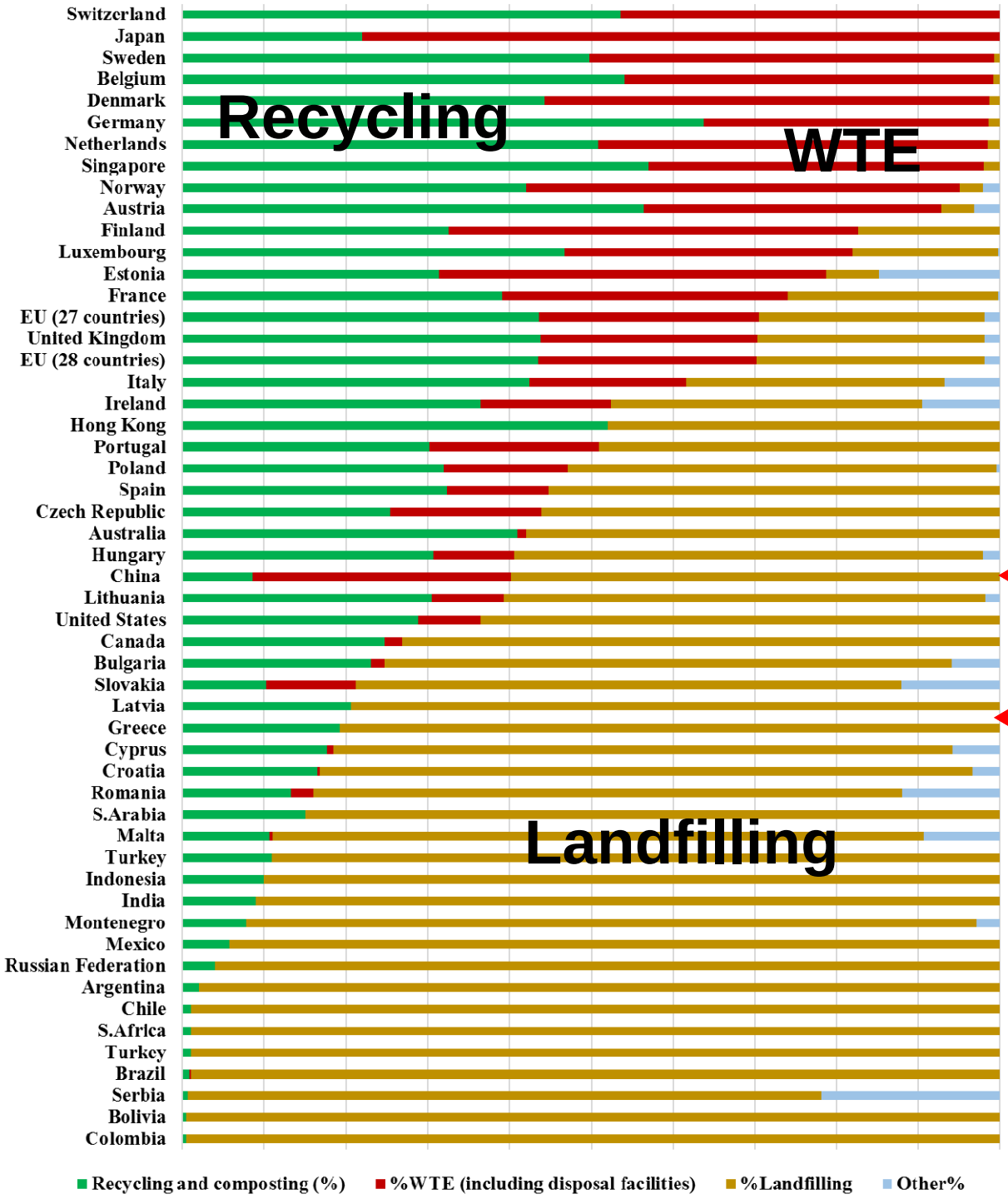
1. What is the Modern Way of managing municipal solid wastes (MSW)

2. Why it is the Perfect Time for Greece to join other developed nations:

- The landfill serving one half of Greece (Ano Liossia-Phyli) is way past its useful life
- A nation blessed with world famous climate and land should not continue converting it to landfills
- Technology is now available at an affordable capital cost
- Outside investment is available and the return on investment will be very high



Methods of managing MSW



"Ladder" of sustainable waste management of nations

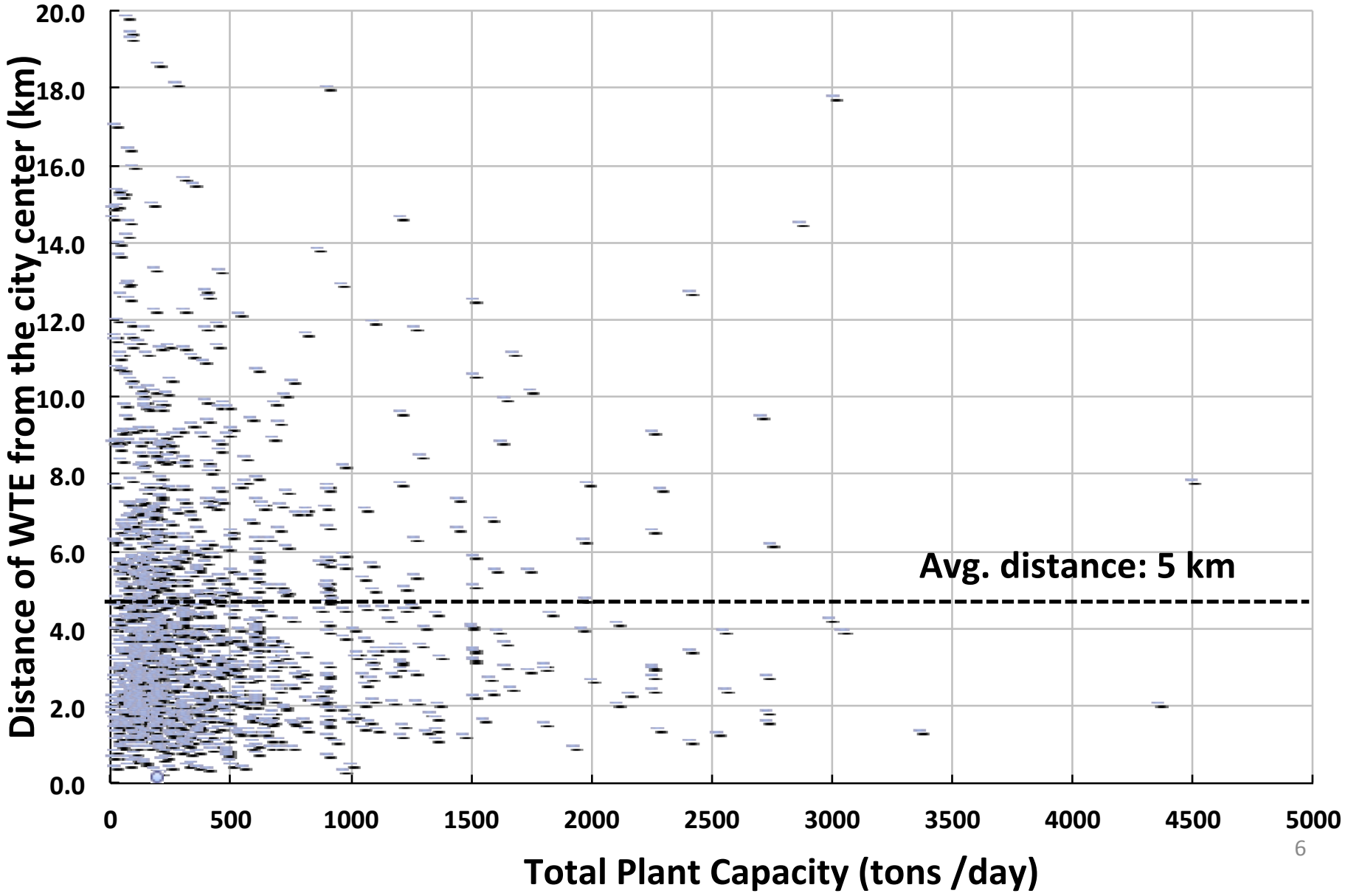
China

Greece

Advantages of WTE over landfilling

- Destruction of pathogens
- Conservation of land, especially near cities
- Renewable electricity and thermal energy
- Reduction in GHG emission: Up to 1 ton CO_2 per ton of MSW going to WTE
- Recovery of metals and minerals from WTE ash

Columbia study: Average distance of global WTEs from city center: 5 km



U.S. dioxin emissions from all industrial sources, forest and landfill fires, flaring of LFG, etc., in grams TEQ

	1987	1995	2000	2012
Total industrial sources	13,833	2,634	998	511
Total industrial plus area sources	16,125	4,925	3,827	3,808
WTE dioxins as % of total U.S. dioxins	58.9%	24.4%	2.0%	**0.08%**

Dioxins from unintended landfill fires in the U.S. in 2012: 1,300 grams TEQ vs. 3 gramsTEQ from WTE

Columbia detailed studies of annual WTE dioxin emissions of four nations

	Year of study	MSW processed (million tons)	Average Dioxin Emissions (ng TEQ/Nm^3)	Total Dioxins Emitted g TEQ/year
USA	2012	25.9	0.027	2.90
France	2010	13.8	0.013	0.79
South Korea	2010	3.9	0.007	0.11
China	2015	61.8	0.1*	24.7

*Assumed national average: 2016 China Everbright average: 0.02 ng TEQ/Nm^3

WTERT

Global landfilling continues at one billion tons each year

Estimated average and final use of land for proper (sanitary) landfilling of MSW: One square meter used up forever, for every 10 tons of MSW landfilled

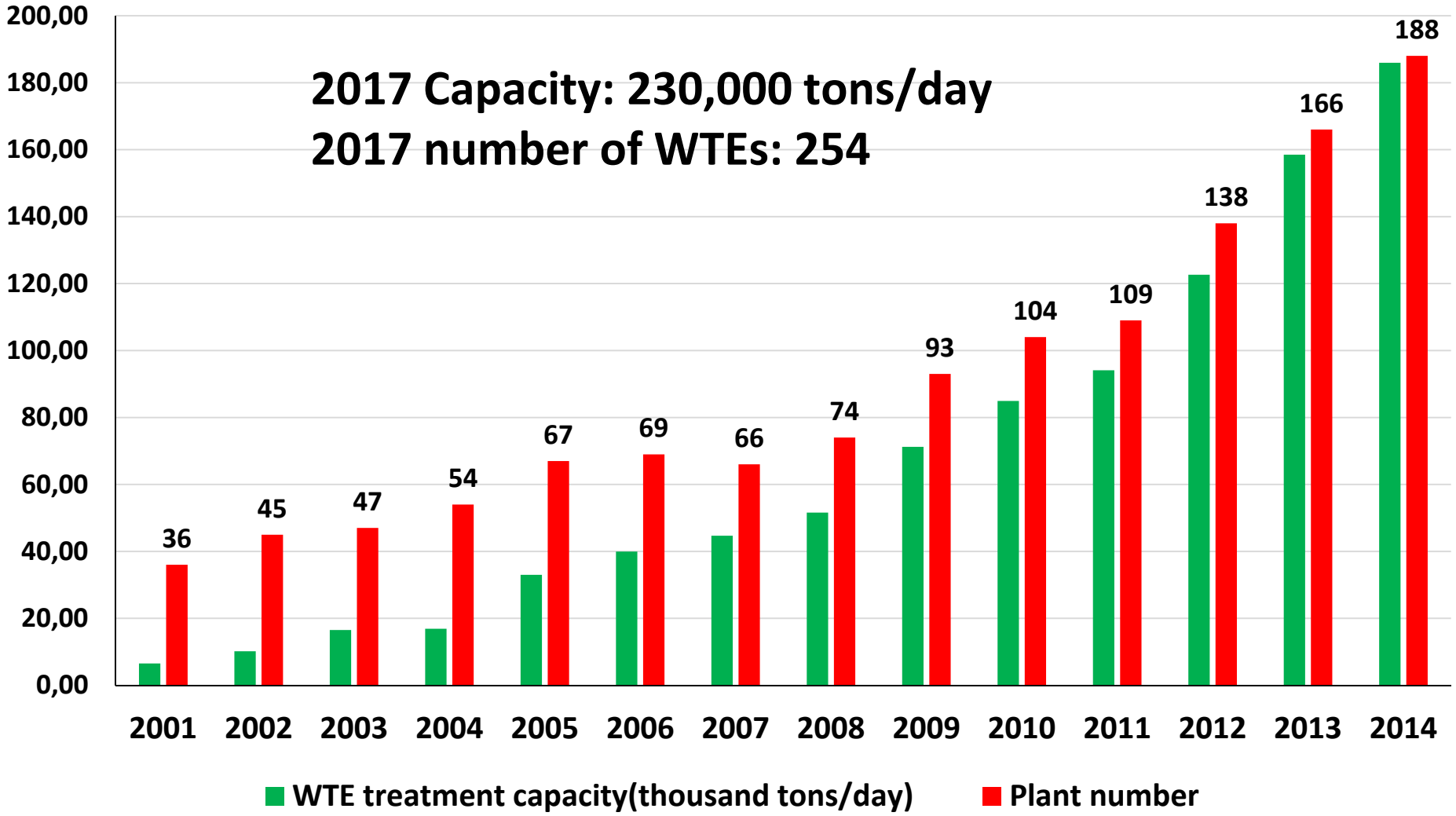
- Current global landfilling in one year converts 100 square kilometers of green fields to landfills
- If all post-recycling MSW were to be landfilled at one location, it would use up, each year, a land surface equal to metropolitan Paris

Reducing the capital investment in WTE plants has made them cost-competitive with sanitary landfills

China has demonstrated that it is possible to reduce the capital cost of WTE plants by means of:

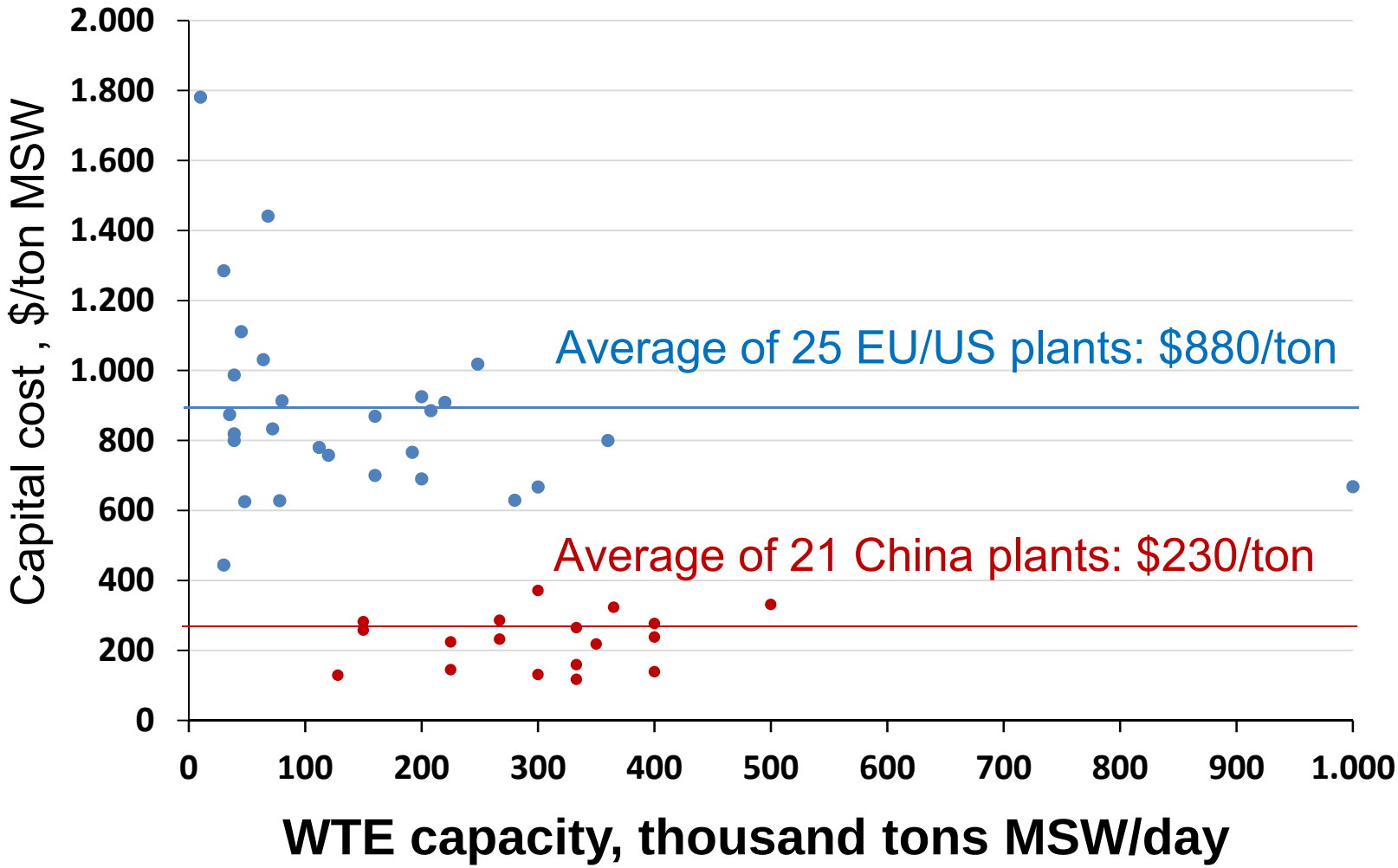
- Favorable national policy
- Industrial and academic R&D
- Rapid growth of industry (30 plants/year), instead of building one plant at the time
- Assembly line manufacturing of WTE equipment

21st Century growth of WTE industry in China



Yating Yu, EEC/Columbia University, 2016

Recent WTE plants built in China at a much lower CAPEX



The Everbright Nanjing WTE
(4,000 tons/day; total investment: $270 million)

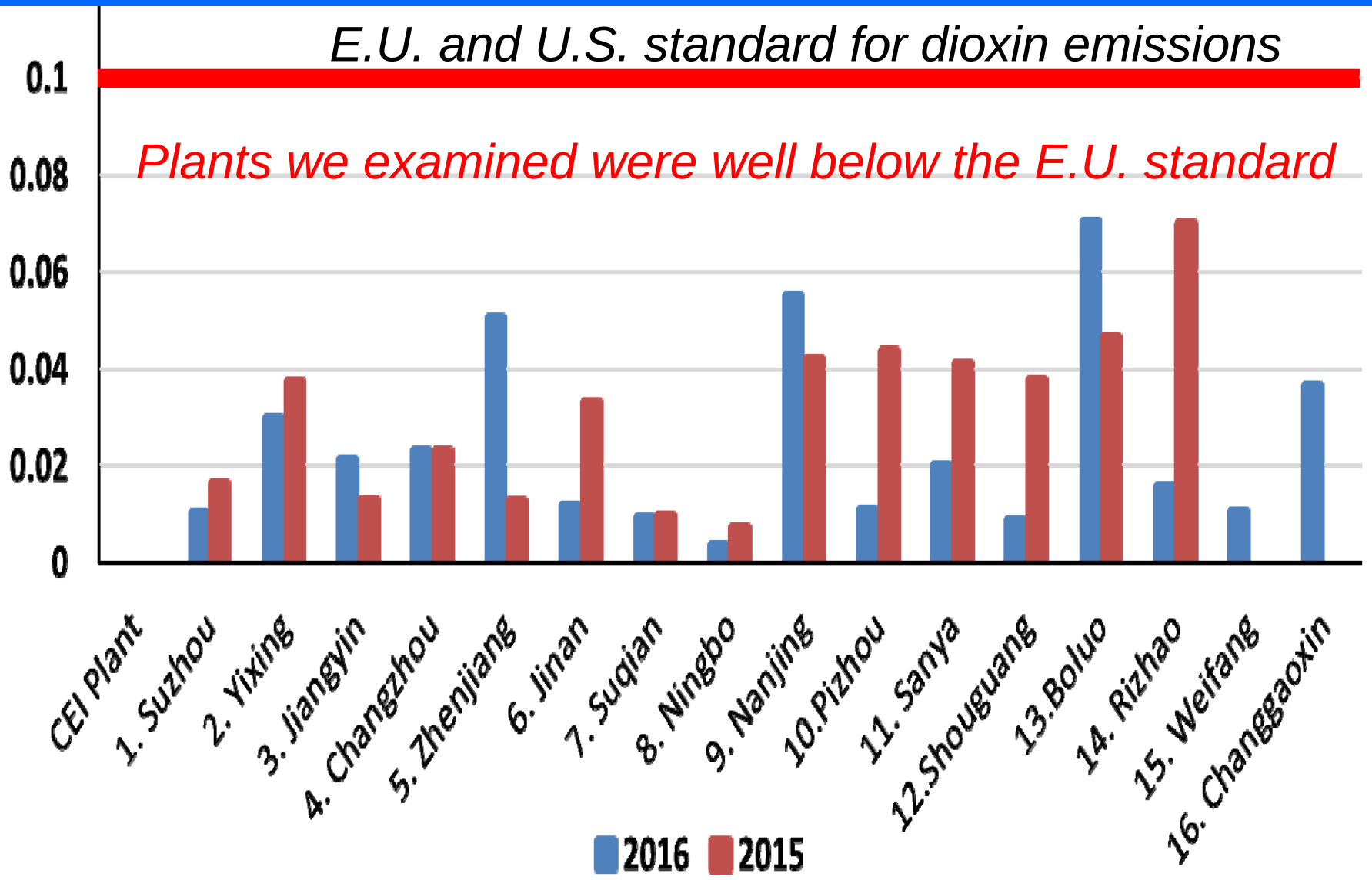
Control room of Nanjing WTE plant

Continuous public display of WTE plant emissions

Everbright manufacturing plant of WTE equipment (Changzhou, China)

2015 and 2016 dioxin emissions of China Everbright plants

(Columbia Univ. 2017 study, ng TEQ/Nm3 stack gas)



The time has come for Greece to join other developed nations

- A one million ton WTE, to serve metropolitan Athens, will cost an estimated $400 million.
- The annual revenue will be $60 million from gate fees (now paid to the landfill) plus $45 million from electricity provided to the grid (500,000 MWh)
- There will be numerous economic and esthetic benefits to communities around the existing landfill

Outside investment is available and return on investment will be very high

- A perfect opportunity for a Private-Public-Partnership project
- Required partner: Major Greek company in construction and infrastructure
- The first and largest WTE in Greece will lead to smaller projects on islands and the mainland.

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IDB Inter-American Development Bank

GUIDEBOOK

FOR THE APPLICATION OF WASTE TO ENERGY TECHNOLOGIES IN LATIN AMERICA AND THE CARIBBEAN

NICKOLAS J. THEMELIS, MARIA ELENA DIAZ BARRIGA,
PAULA ESTEVEZ, AND MARIA GAVIOTA VELASCO

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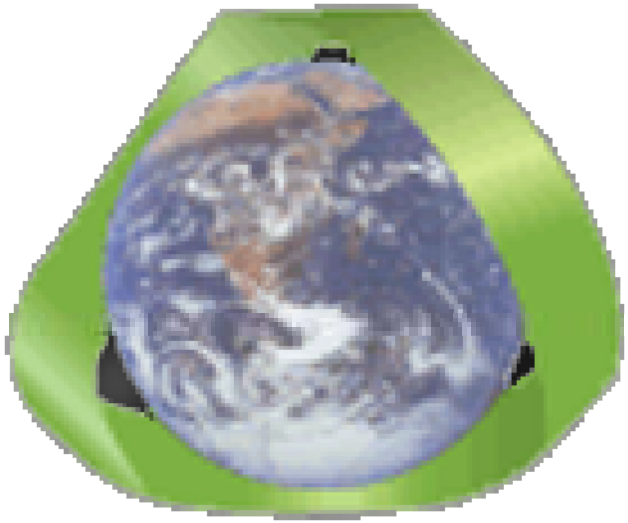
MARCH 2012

See Google "WtE guidebook"

Columbia Guidebook is already available in English, Portuguese, Spanish, and **Greek**

Chinese edition underway

Ευχαριστώ!



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