



CLEAN DEVELOPMENT MECHANISM (CDM) in DISTRICT COOLING – “Environmental Finance”

districtCOOLING2016 – A Climate Solution



- ☐ Dubai Carbon at a Glance
- ☐ Relevance of District Cooling / Recent Developments and Studies
- ☐ Environmental Finance Mechanism for District Cooling Projects
- ☐ Dubai Carbon AND Empower Engagement with UNFCCC





DUBAI CARBON AT A GLANCE

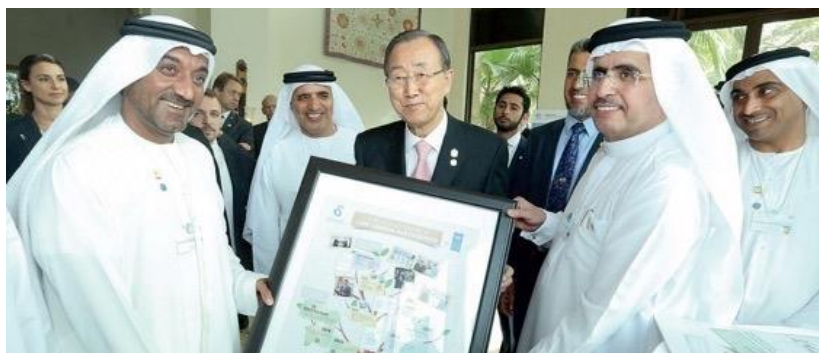
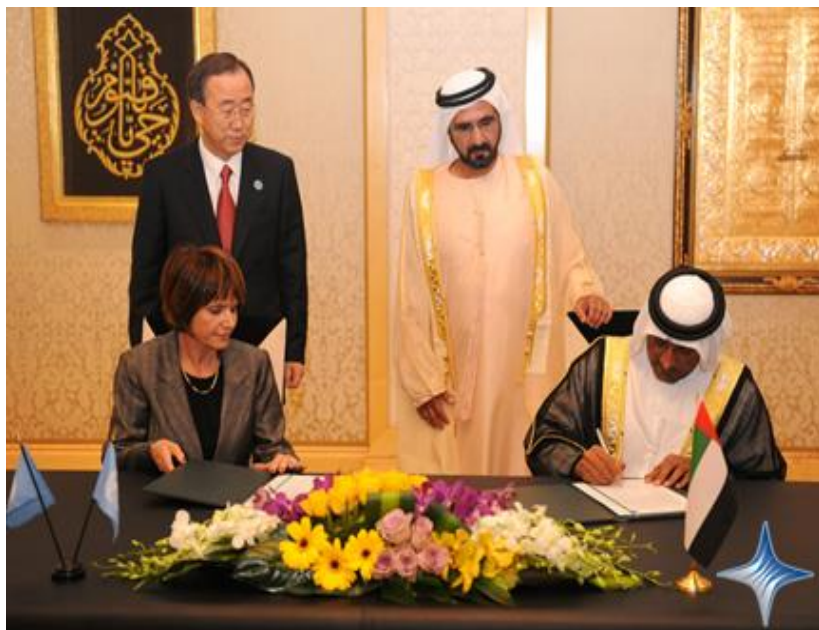


DUBAI CARBON AT A GLANCE

Timing & Nature of our business have been key to its success



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DUBAI CARBON



- Established on January 18th, 2011
- Launched under the Dubai Supreme Council of Energy (DSCE) during the World Future Energy Forum in 2011
- Forms Public Private Partnership (PPP) together with the UNDP

**synergy and business-lead approach
between legislation and markets**

- Headquartered in Dubai, UAE
- Growing regionally throughout the GCC countries
- Dubai level and UAE level focal point to capture, analyze and harmonize GHG data which is utilized by public & private sector for country level negotiations

DUBAI CARBON AT A GLANCE

Our Multi Stakeholder Approach



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المجلس الأعلى للطاقة
Supreme Council of Energy



Energy Cluster created to foster Green Economic Growth amongst the stakeholders

Private-Sector-lead, supported by key leaders in utilities, smelter and refinery

Close partnership with International Organization and especially UNDP

Structured to maximize economic benefits through Porter's Economic Clusters Model

هيئة كهرباء ومياه دبي
Dubai Electricity & Water Authority



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dubal
Dubai Aluminium



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RELEVANCE OF DISTRICT COOLING/ RECENT DEVELOPMENTS AND STUDIES

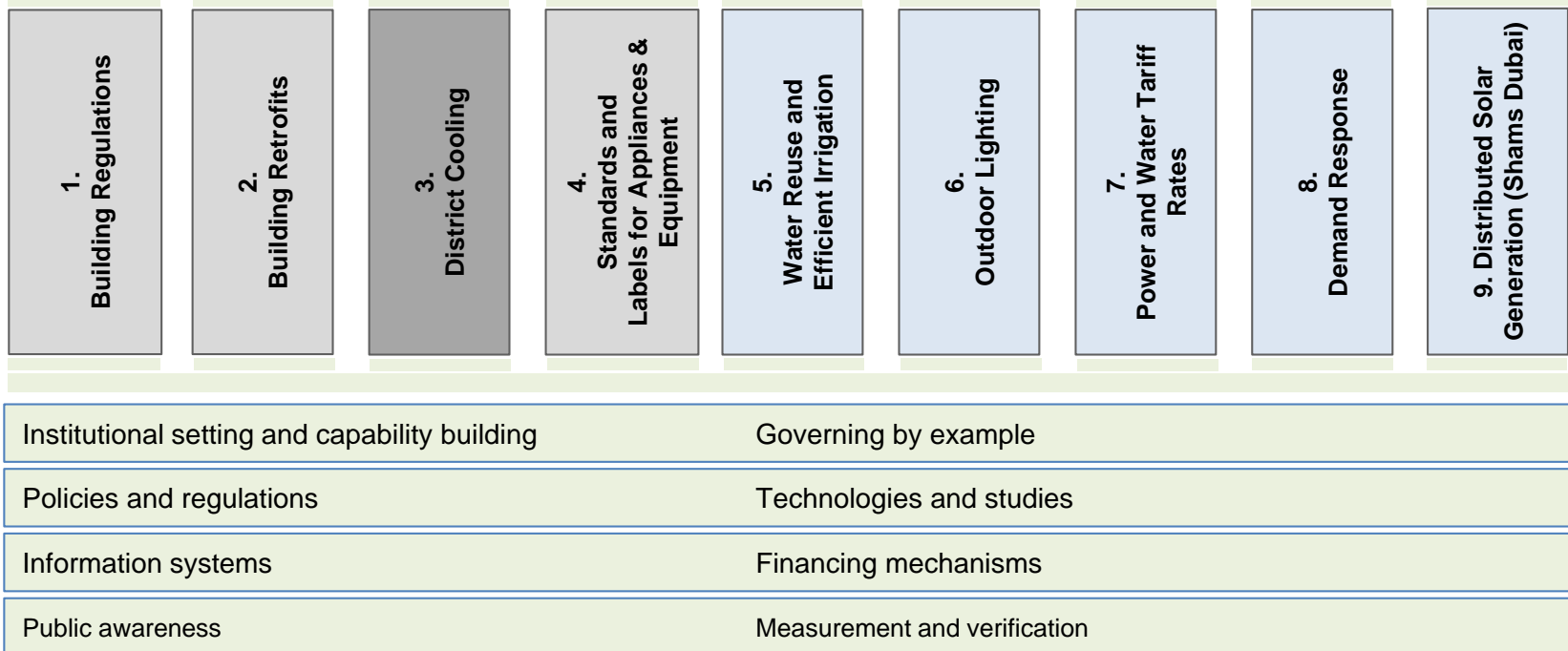


RELEVANCE OF DISTRICT COOLING - UAE

Increase penetration of District Cooling to up to 40% in 2030 by regulating the industry

Cooling is Dubai's major energy use and so any strategy intended to raise energy efficiency will have to tackle cooling – both efficiency in its supply and in its use

Dubai Demand Side Management Strategy 2030



RELEVANCE OF DISTRICT COOLING - UAE

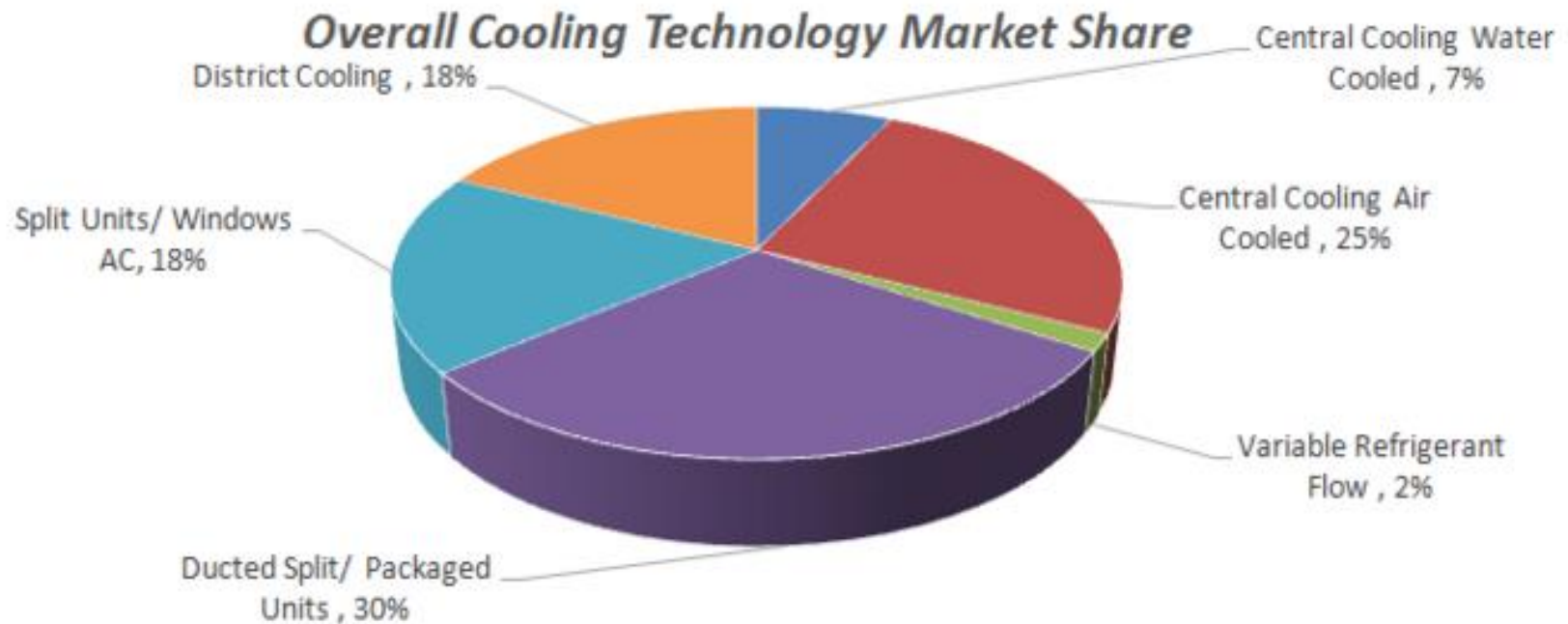
UAE as a leader in adopting district cooling systems as the preferred alternative to conventional air conditioning

- UAE district cooling companies are expected to play pivotal roles in the growth of the industry across MENA
- Projected to grow by over 18% in the next 5 years
- MENA district cooling companies are expected to dominate over 40% of the overall demand globally by 2019
- This translates to nearly US\$ 29 billion in value terms in the next 4 years
- Cooling can account up to 70% of a building's electricity bill, during the peak hours



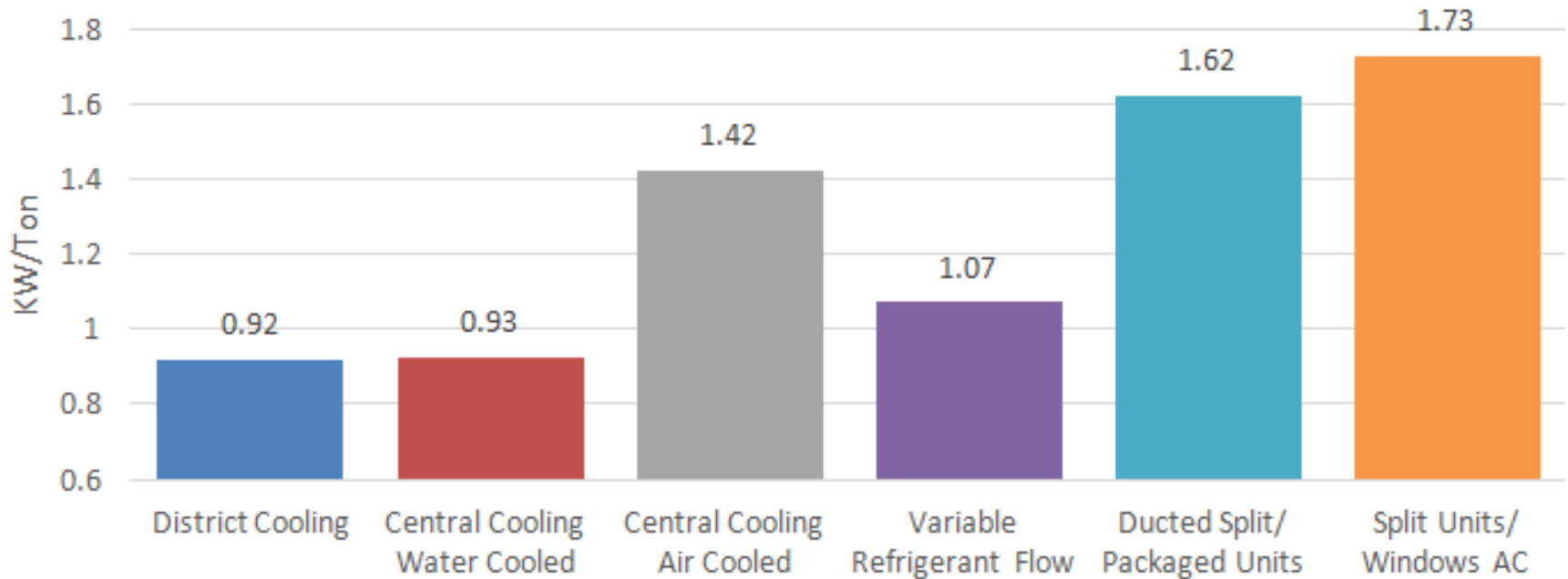
RELEVANCE OF DISTRICT COOLING - UAE

RSB Dubai commissioned a study “Cooling Market Share and Efficiency Comparisons” to support the DSM implementation



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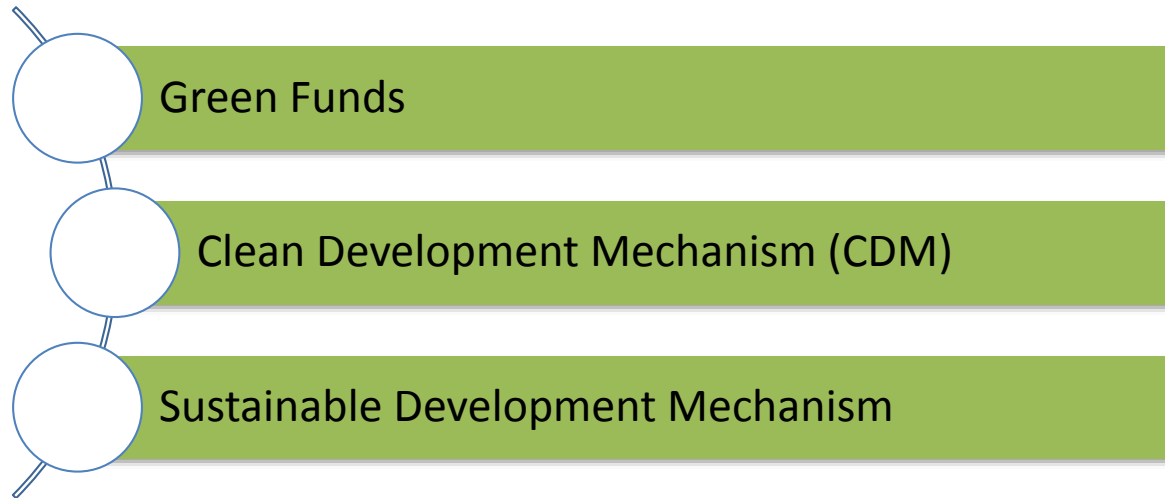
ENVIRONMENTAL FINANCE MECHANISM FOR DISTRICT COOLING PROJECTS



ENVIRONMENTAL FINANCE

Several mechanisms to catalyze investment into the green technologies, practices which are not only possible, but also economically attractive

Environmental finance is the use of various **financial instruments** to protect the environment. The field is part of both **environmental economics** and the **conservation movement**

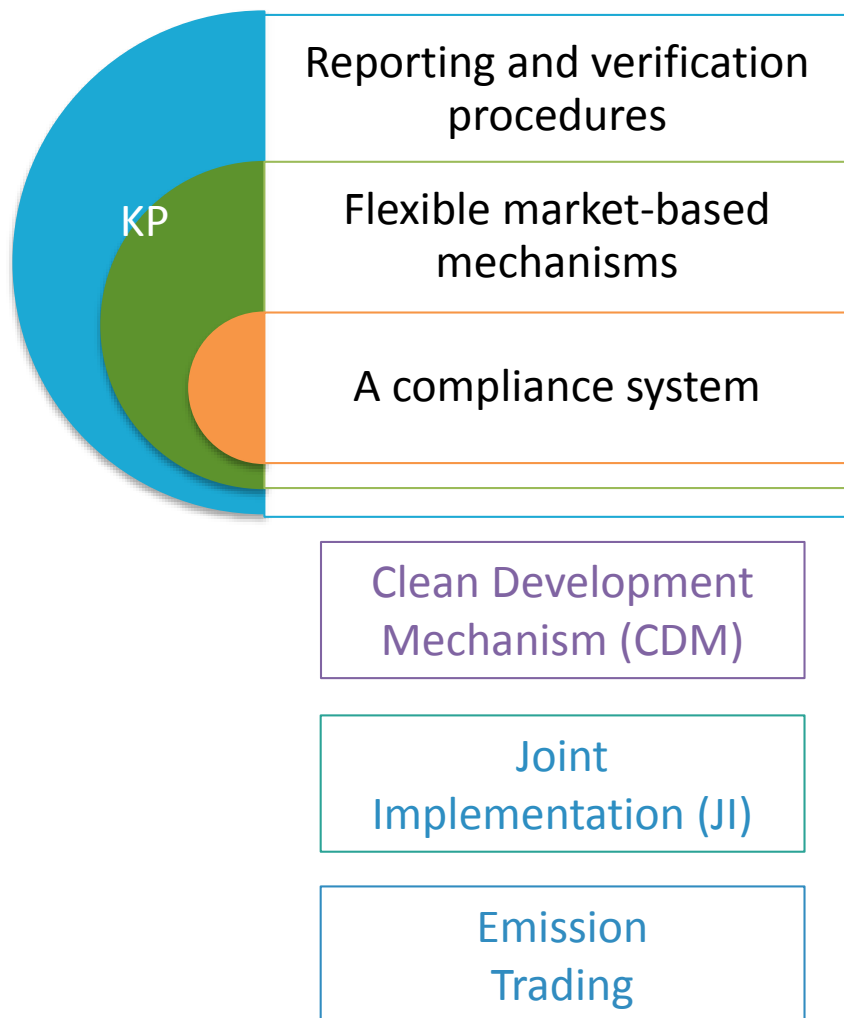


- **UNFCCC** is the United Nations Framework Conventions on Climate Change
- Entered into force on 21 March 1994
- A global legal instrument (international agreement) to protect the climate system and stabilize GHG emissions
- 197 countries that have ratified the Convention are called **Parties to the Convention**
- Developed and developing countries agreed to the Kyoto Protocol as a legal tool to reduce global GHG emissions
- Under Kyoto, Developed Countries (Annex 1) are committed to reduce GHG emission



United Nations
Framework Convention on
Climate Change





- Entered into force 2005 after achieving ratification by Russian federation
- “Operationalizes” the Convention-Commitment
- Sets binding targets for 37 industrialized countries and the European Community
- Average 5% emissions reduction compared to 1990 levels (2008 to 2012)
- Signatories: 83, Parties: 19

Doha Amendment (COP18)
Second commitment period, starting on 1 January 2013 until 2020

Objectives

1. Assist non-Annex I Parties:

- meet their sustainable goals and priorities, by hosting projects that contribute to these goals, and
- contribute to UNFCCC's overall objective of stabilising global concentrations of greenhouse gas emissions; and

2. Assist Annex I Parties to meet their targets at a lower cost, by allowing the use of CERs generated by CDM projects in non-Annex

Currency:

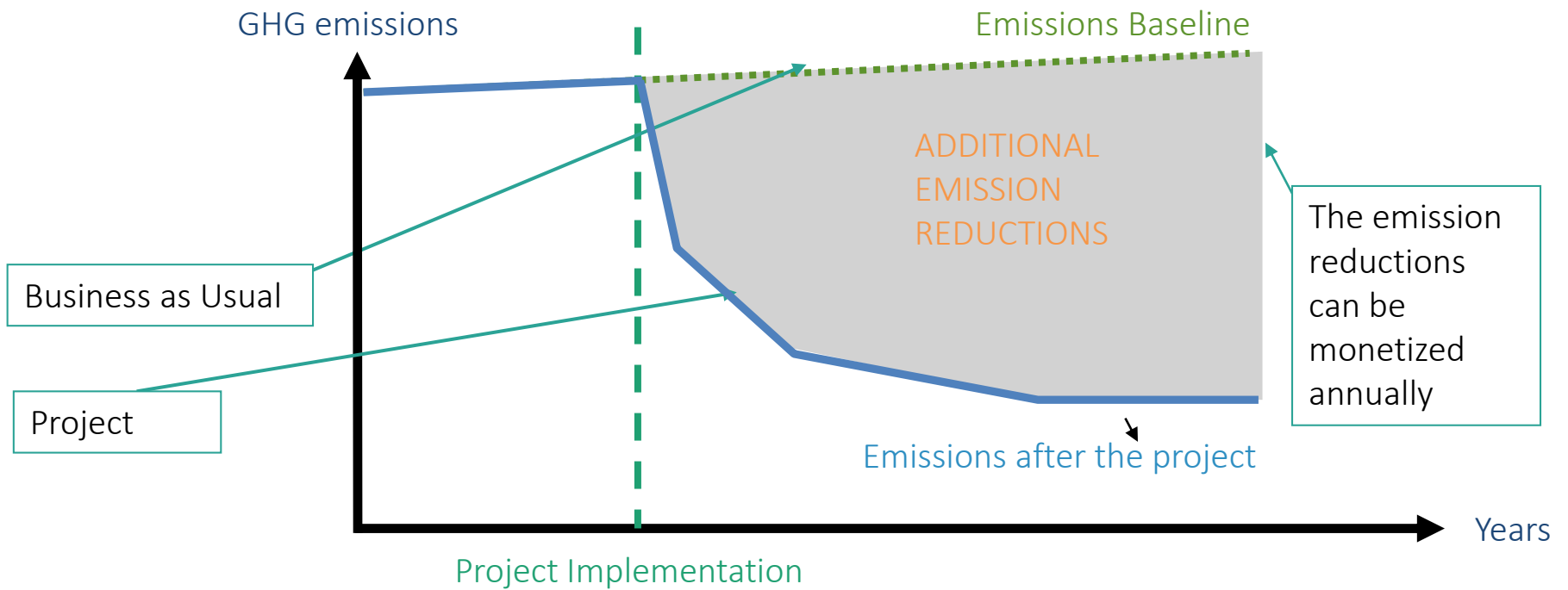
CDM projects generate Certified Emission Reduction (CER)

1CER = 1 tonne of CO₂

THE CONCEPT OF CDM



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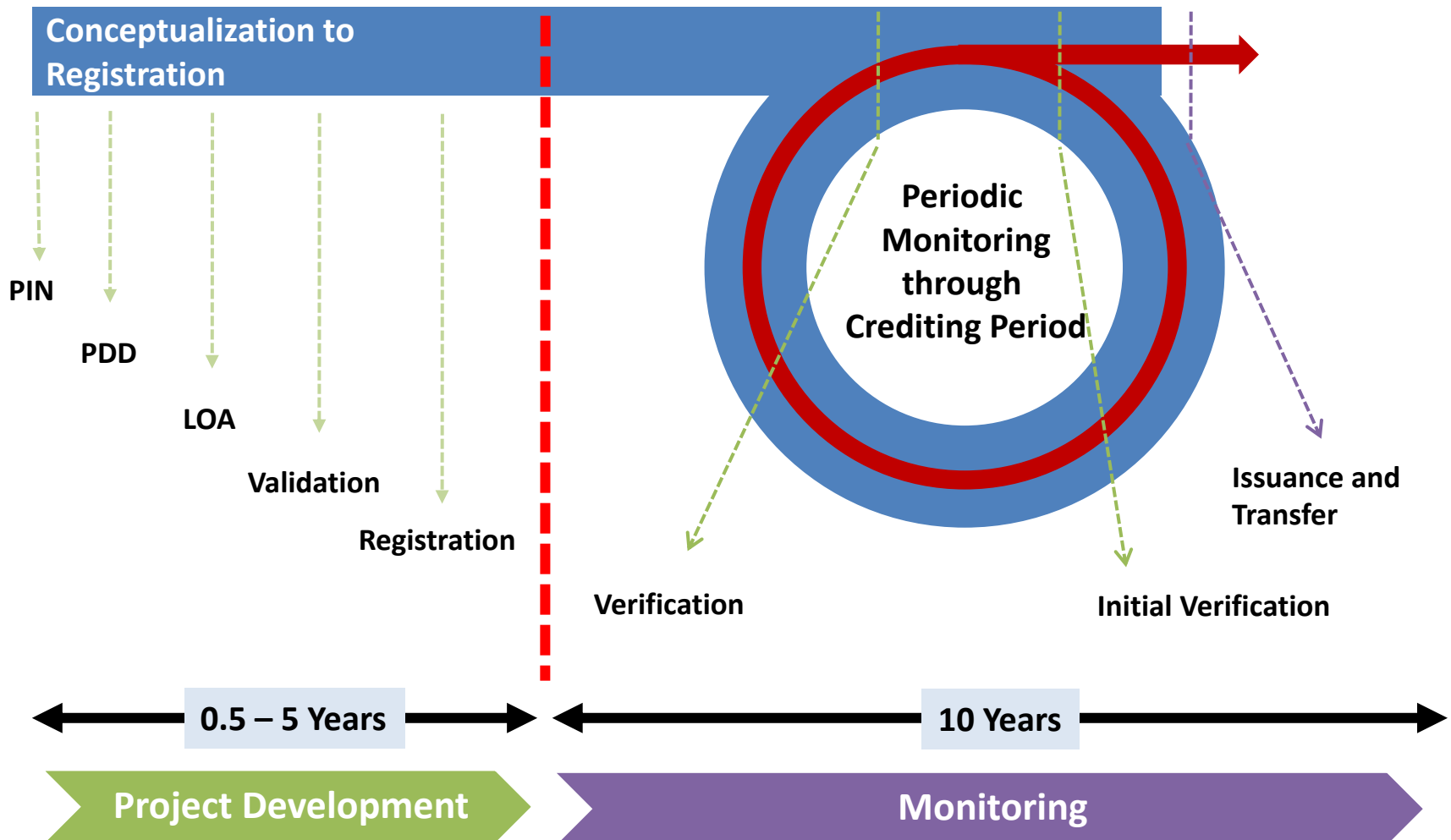


- UAE has ratified the Kyoto Protocol in 2005
- UAE can benefit from CDM Projects / Programs contributing towards the country's sustainable development goals both environmentally and economically
- Total Registered Project Activities & PoAs = 15

CDM PROJECT CYCLE



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CARBON PRICING

Rising awareness: Voluntary buyers demand 85 Mio tCO₂ in the Lead up to Paris

- 2015 was a pivotal year for climate change (impacts and actions)
- Highest average global temperatures on record / Paris Agreement and COP 21
- Voluntary buyers transacted a total of 85 Mio tCO₂ in 2015 (increase of 10%)
- Average price 3.3 USD/tCO₂ and overall market value of 280 Mio USD
- Prices highly variable 0.1 USD/tCO₂ – 44.8 USD/tCO₂
- Preferences on type, standard, vintages, locations

	2015	2014*	% CHANGE	ALL YEARS**
VOLUME:*	84 MtCO ₂ e	77 MtCO ₂ e	+10%	0.99 BtCO ₂ e
VALUE:***	\$278 M	\$298 M	-7%	\$4.6 B
AVERAGE PRICE:***	\$3.3 / tonne	\$3.8 / tonne	-14%	\$4.6 / tonne

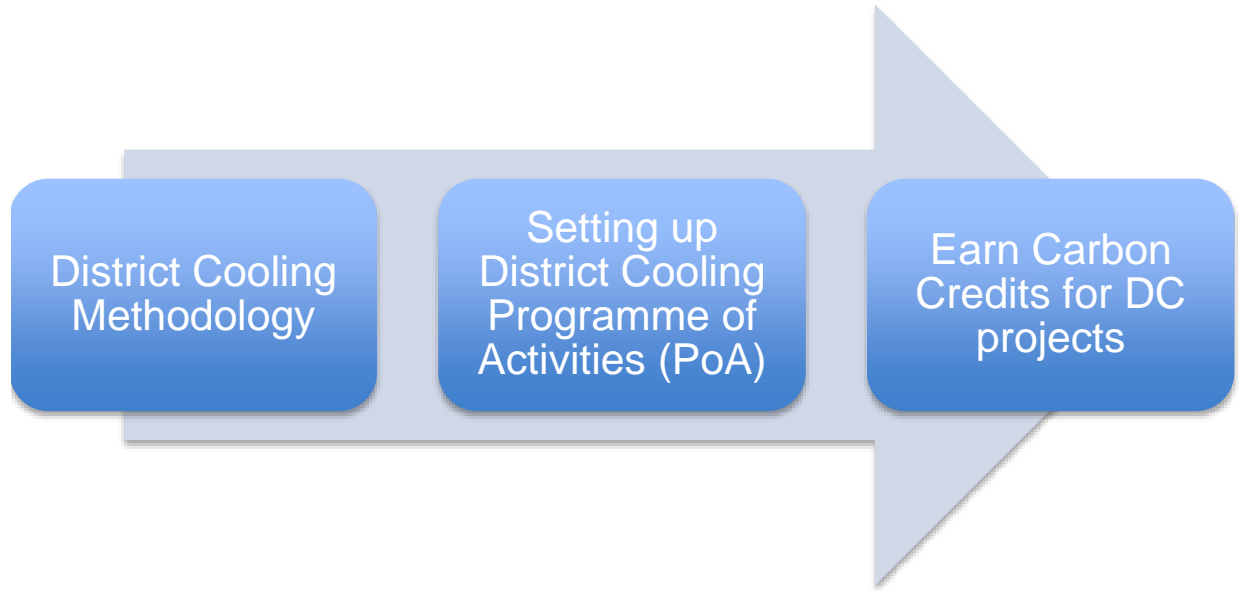


DUBAI CARBON and EMPOWER ENGAGEMENT WITH UNFCCC



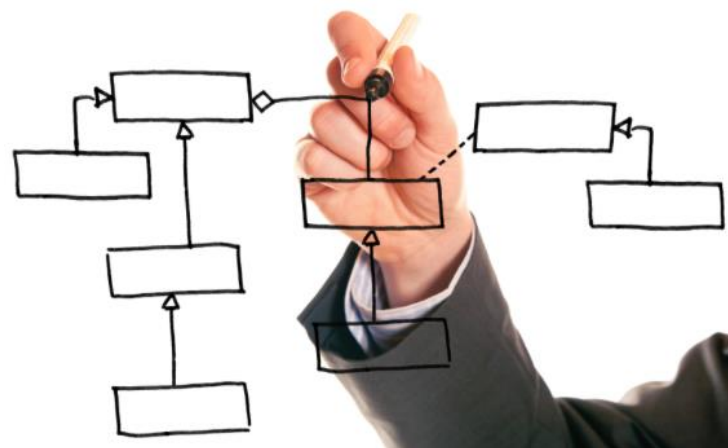
DUBAI CARBON SUPPORT FOR DC

Promoting registration of projects under an umbrella framework to reap the benefits of district cooling emission reductions in the most efficient manner



With DC implementation requiring high upfront costs, environmental credits can be an added source of support to promote various players in the UAE market and also to provide international recognition

- A methodology is an application of an approach as defined by the UNFCCC modalities and procedures to a project activity, reflecting aspects such as sector, circumstances and the monitoring of emission reductions
- No registered methodology has been available with the UNFCCC, specific to district cooling
- The methodology once developed will aid the registration of emission reduction with the UNFCCC





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- Proposed new Methodology submitted to the UN in August 2015
- Recommendation for Approval in October 2016
- Approved in November 4th (92nd UN Executive Board Meeting held in Marrakesh, Morocco)

CLEAN DEVELOPMENT MECHANISM

CDM-EB92-A03

Large-scale methodology

AM0117: Introduction of a new district cooling system

Version 01.0

Sectoral scope(s): 01



United Nations
Framework Convention on
Climate Change

DISTRICT COOLING METHODOLOGY

Key aspects



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Applicability

- Introduction of new district cooling systems (plant and/or network)
- Expansion of existing district cooling system (plant and/or network)

Project emissions

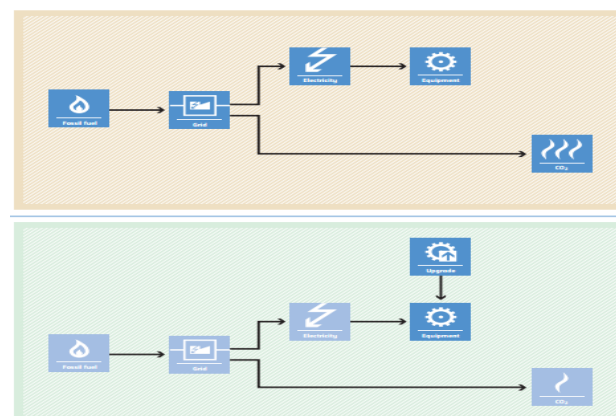
- Electricity consumption of associated with operation of DC Plant (Grid emission factor)

Baseline

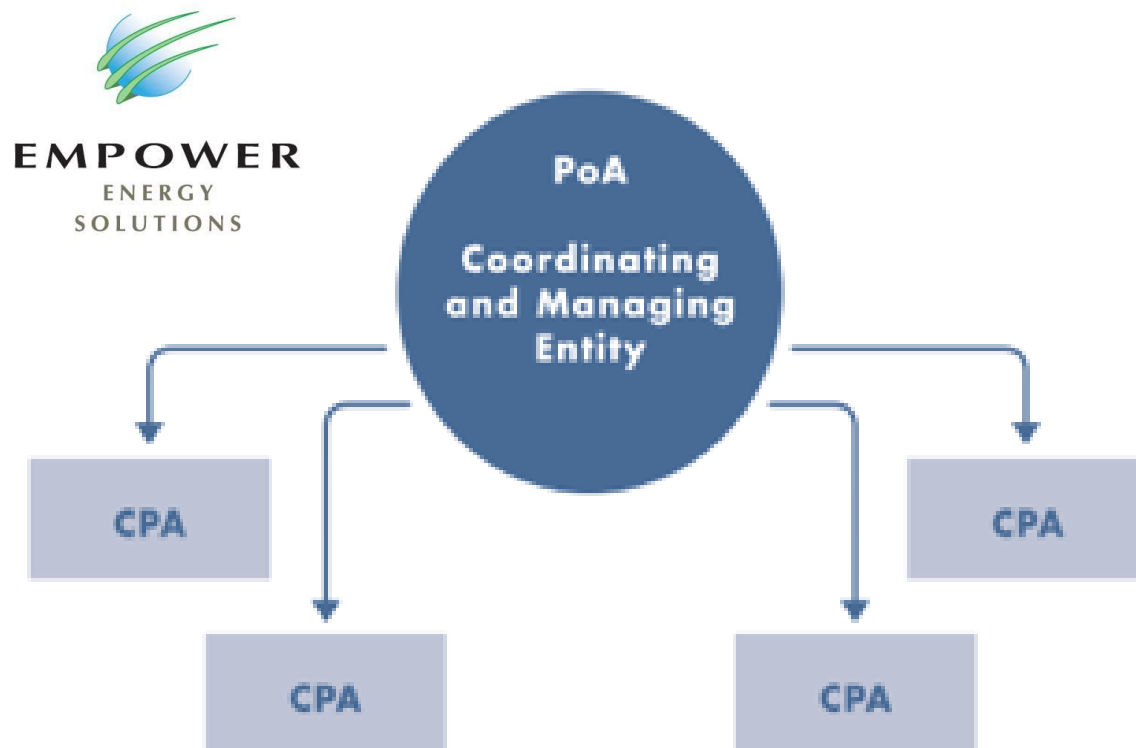
- Electricity consumption associated with the operation of the Baseline Cooling Technologies (Seasonal Energy Efficiency Ratio, Grid emission factors)



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A **program of activities (PoA)** is a voluntary coordinated action by a private or public entity who coordinates and implements any policy/measure or stated goal (i.e. incentive schemes and voluntary programs).



‘UAE District Cooling PoA’ has obtained the host country approval



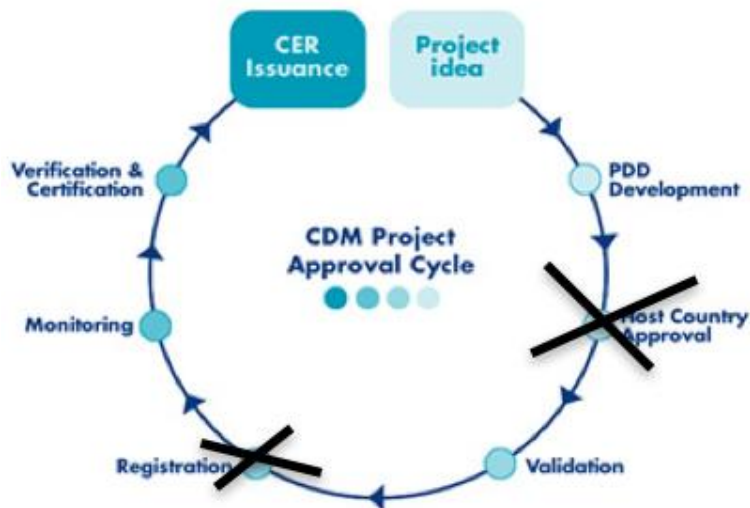
UNITED ARAB EMIRATES
MINISTRY OF ENERGY

The CPA (Component Project Activities) will be the individual DC projects

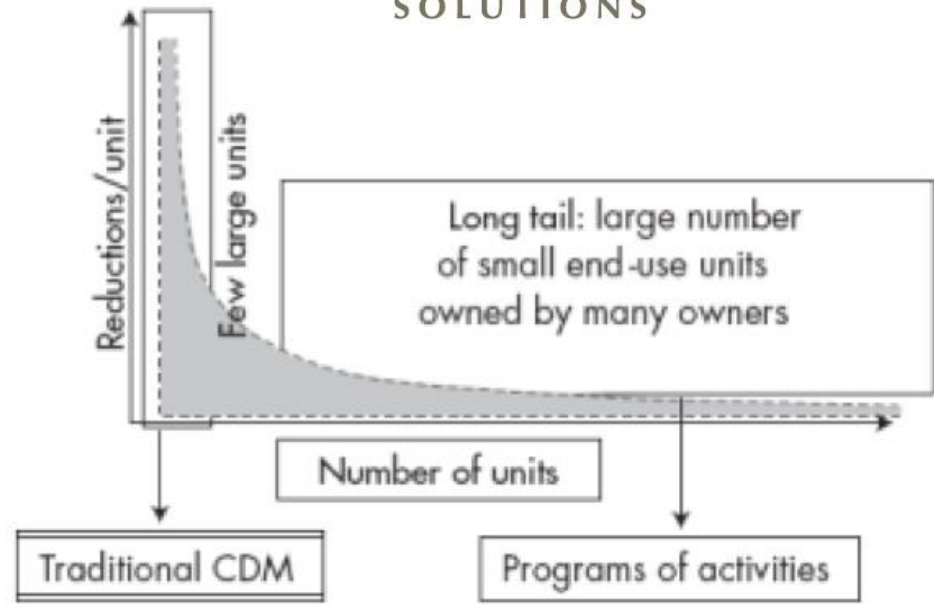
PROGRAMME OF ACTIVITIES

Easier registration of projects with the UNFCCC for a group of similar projects

Projects under PoA require less registration time compared to standalone CDM projects and the transaction costs are relatively low



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PROGRAMME OF ACTIVITIES

Project Description and technological measures

- Introduction of a new district cooling plant with thermal energy storage system
- Replaces isolated and less efficient cooling technologies (air cooled reciprocating chiller system)
- Energy efficiency increase: 1.51 – 0.9 kW/TR
- Reduction of electricity consumption and corresponding emissions



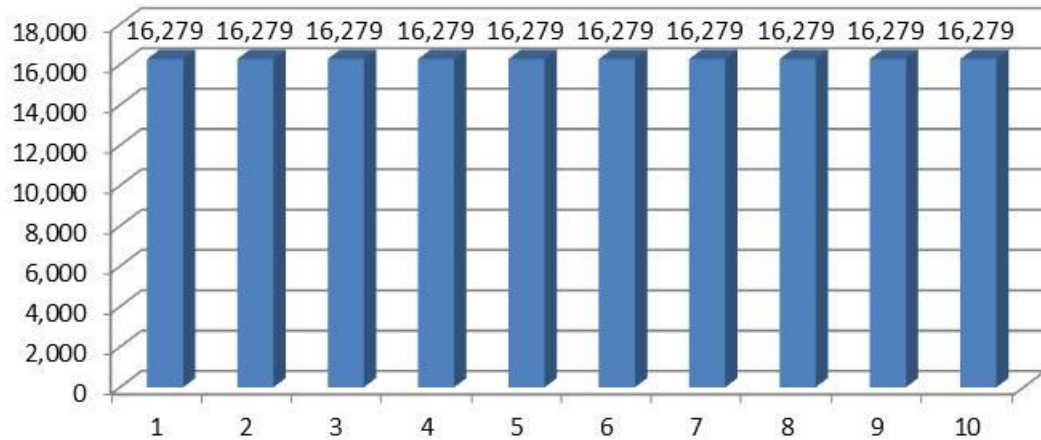
PROGRAMME OF ACTIVITIES

Project Emission Reductions



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Emission reductions (t CO₂e)



Baseline = 63,796 tCO₂/yr

Project = 47,517 tCO₂/yr

Leakage = 0 tCO₂/yr

Energy Savings:
59 Gwh_{el}/yr

GEF:
0.410
t/MWh

Baseline: Operation of isolated and less efficient air-cooled reciprocating chillers

Project: New district cooling plant with thermal energy storage

Crediting period: 10 years – fixed non renewable

PROGRAMME OF ACTIVITIES

Emission reduction potential for Dubai

Estimated CO2 savings by district cooling in 2016

- 2,119 GWh/yr - current electricity consumption by District Cooling (0.9 kW/TR)
- 3,479 GWh/yr - electricity required if cooling was provided by conventional cooling technologies (1.51 kW/TR)
- Emission reduction potential: 576,000 tCO₂/yr

PROGRAMME OF ACTIVITIES

Emission reduction potential for Dubai

Estimated CO2 savings by district cooling in 2021

- 18% 2015 market penetration
- 28% 2021 target market penetration
- 18% market growth forecast 2016 - 2021
- Emission reduction potential in addition: 751,000 tCO2/yr

PROGRAMME OF ACTIVITIES

Contribution to sustainable development

The Project is in alignment with the UAE sustainable development goals and criteria as it supports the emission mitigation actions of the country

- Conservation of energy sources
- Education and training of staff in operation of district cooling systems
- Potential for reducing the consumption of desalinated water
- Know how transfer of energy efficient technology into UAE with potential of replication to other cities in the region

CONCLUSIONS

- District Cooling has been identified as a crucial element for a sustainable economy
- Governments worldwide and in the region, emphasize the need for district cooling
- The market is expected to grow significantly, especially in the coming years
- In the context of the Paris Agreement, the role of environmental finance as support mechanism is gaining prominence
- Dubai Carbon and Empower are developing a PoA for District Cooling, to promote the region's industry



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