ISTANBUL
SMART METROPOLES
Integretad solutions for Sustainable and Smart Buildings & Cities

13 - 15 October 2016
Swissotel The Bosphorus İstanbul

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Turkey

Population: 80,000 (2016)
Capital: Ankara
Area: 85,000 km²
Energy Issues in Turkey

• GDP Growth **9% in 2010, 8.5% in 2011** and **2.2% in 2012**.

• **Primary energy demand** increased with an average growth rate of **2.9%** between 1990 and 2012.

• In 2013, **primary energy consumption** increased by **32%** from 2005.

• About **93%** of primary energy was supplied by **fossil origin resources** in 2013.
Climate Change Issues In Turkey

Mediterranean Basin
increase in temperatures up to 1°C - 2°C
increase in the number of heat waves and very hot days

Turkey
the average increase in temperatures 2.5°C - 4°C,
inner regions up to 5°C
Aegean and Eastern Anatolia up to 4°C
Turkey’s national vision according to The Climate Change Action Plan 2011-2023

- to become a country fully integrating climate change-related objectives into its development policies,
- disseminating energy efficiency,
- increasing the use of clean and renewable energy resources,
- actively participating in the efforts for tackling climate change within its “special circumstances”,
- providing its citizens with a high quality of life and welfare with low-carbon intensity.

Energy consumption of Turkish government buildings has to be reduced by at least **20% in 2023 compared to 2010**

(The Law on Improving Energy Efficiency for the Utilization of Energy Resources and Energy (2011) )
Total GHG Emissions of Turkey and Sectoral Change

Cummulative Increase Rate of GHG Emissions Between 1990 - 2013

Sectoral Sources of GHG Emissions CO2e

Energy  Industrial processes and product use  Agriculture  Waste

Source: RECTurkey
Data Sources: TUİK
Total GHG Emissions and Sectoral Change (20 years)

Source: REC Turkey
TOP 30 Emitters - 1990

GHG Emissions, Per Capita CO₂e kg/year excluding LUCF, 1990
Area: GHG Emissions, Total CO₂e Excluding LUCF, 1990

Per Capita GDP PPP, Current $, 1990

Source: REC Turkey, WRICAIT, World Bank
TOP 30 Emitters - 2012

Source: REC Turkey, WRICAIT, World Bank
### Selected Key Indicators for 11 Developing Countries

<table>
<thead>
<tr>
<th>GHG Emissions Rank &amp; Per Capita CO2e kg (1)</th>
<th>Country</th>
<th>Population Rank &amp; Data (millions) (2)</th>
<th>GDP Rank &amp; Data (Billion $) (3)</th>
<th>Total GHG Emissions Rank &amp; Data million ton CO2e (4)</th>
<th>GHG Intensity (Total GHG / Total GDP) Rank &amp; Data (5)</th>
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<tbody>
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</table>

Source: RECTurkey

(1) WRI CAIT 2012 (Including LUCF)
(2) World Bank 2012
(3) World Bank 2012
(4) WRI CAIT 2012 (Excluding LUCF)
(5) Calculated
Change in Per Capita Emissions (1990 – 2012)

GHG Emissions, Per Capita CO₂e kg

Source: RECTurkey, Data Source: WRI CAIT (Including LUCF)
Turkey declared on 30 September 2015 that there will be up to 21% reduction in GHG emissions from the Business as Usual (BAU) level by 2030.
Turkey’s COP21 Intended Nationally Determined Contribution (INDC)

This declaration is expected to have negative impacts;
• on water and soil resources that are necessary for food production and security
• on development estimates in rural areas.

Adaptation as well as Mitigation is needed because;
• Besides the long-term impacts of climate change, Turkey is a country that is currently struggling against the vulnerability of water resources
• Coastal areas are facing rising sea levels, salty water mixing with fresh water and more frequently observed meteorological hazards due to the impacts of climate change
Energy

- 10 GW solar power
- 16 GW wind power
- Tapping the full hydroelectric potential
- Reducing electricity transmission and distribution losses to 15%
- Rehabilitation of public electricity generation power plants
- Establishment of micro-generation, co-generation systems and production on site at electricity production
2030 Renewable Energy Potential

- **HYDROLIC**: 160,000 GWh/yr
- **WIND**: 48,000 MW
- **SOLAR**: 1,520 kWh/m²-yr
- **BIO MASS**: 120,000 MWh
- **JEO THERMAL**: 31,500 MWt
  - 2000 MWe

Wind Power Potential Map
Solar Power Potential Map
Biomass Potential Map
2030 Renewable Energy Policies

- Wind: 2016 5.751 MW, 2030 16.000 MW
- Solar: 2016 832.5 MW, 2030 10.000 MW
Buildings and Urban Transformation

- New buildings in accordance with the Energy Performance of Buildings Regulations
- Energy Performance Certificates for new and existing buildings
- Reducing the consumption of primary energy sources by the use of renewable energy sources
- Green Building, passive energy, zero-energy house design
Urban population

2/3 of the world population

3.3 billion and reach to 5 billion till 2030.

So best solutions in practice at global level are necessary to improve **life quality and sustainability** in cities.

metropolitan areas mega cities
350 million people are living in the urban areas in European cities that are nearly 70% of the overall population.

70% of CO₂ emissions are generated in cities.

75% of Europe’s GDP is produced in metropolitan districts, while their population only represents 59% of the total European population.

Metropoles are important!!
The total Carbon Emission of the conference was 20,88 ton CO$_{2eq}$ and it was neutralized.
## Urban areas and building clusters

- Current Green House Gas (GHG) emissions
- Earthquake risk
- Flooding risk
- Ecological sensitivity

## New and existing buildings

- Earthquake risk
- Professional skill deficits
- Worker skills deficits

## Materials and products

- Minimizing product imports
- Maximizing product exports

## Key performance indicators:

- **Social, cultural, economic, financial, environmental impacts, functionality**
  - Efficiency of local transport
  - Land use efficiency
  - Green space, urban agriculture
  - View corridors and aesthetics
  - Fit with local streetscape

- **Energy & emissions, Water, Indoor Environmental Quality (IEQ)**

- **Shifting to less scarce materials**
  - Production efficiencies
  - Recycling and C&D waste

## Methods, tools and techniques

- **Urban area assessment**
  - ICT

- **Integrative Building Design Approach (IBDA)**
  - Energy simulations,
  - Building Information Modelling (BIM),
  - Building Environmental Modelling (BEM),
  - Building Assembly Modelling (BAM),
  - Building Optimisation Modelling (BOM),
  - Fluid dynamics simulations,
  - ICT

- **Production technologies**
  - CAD - CAM rapid prototyping
  - Additive manufacturing
  - Reuse of Building components
  - Environmental Product Declarations (EPD)

## Policies, standards and regulations, action strategies, programs and projects demonstrations

- **Green neighbourhood standards**
  - Solar rights zoning
  - Policies for small urban project development
  - Gov’t climate change strategy
  - Gov’t water conservation strategy
  - Self-sufficient neighbourhoods

- **Synergy zone demonstrations**

- **Mixed-use demonstrations**

- **Other demonstrations**

- **Green building standards**
  - Regulations for energy & emissions
  - Regulations for water consumption
  - Other building regs or standards

- **Earthquake standards**

- **Nearly Zero Energy Buildings (NZEB)**
  - Incentives for high performance buildings
  - Demonstrations of performance
  - Training for professionals
  - Training for on-site workers

- **Best Practices**

- **Product Environmental Footprints EN 15804**

## Innovation

- **Renewables in urban zones**

- **Mixed use in small urban zones**

- **System synergies in urban zones**

- **Building-integrated PV and SHW**

- **Buildings with totally flexible uses**

- **DC distribution in buildings**

- **Public Private Partnerships (PPP) for high performance buildings**

- **Leased building systems**

- **Best Practices**
New Roadmap For The Construction Sector:

Reduce Your Carbon
Get An Innovative Approach
And Plan Your Future!
Thank you...