Opportunities in Energy Efficiency: Green Building and the Industrial Sector

USAID's Energy Efficiency for Clean Development Program (EECDP)

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Opportunities in Energy Efficiency

High Impact Project & Strategies #3: *Green Building Councils and Stakeholder Support in Tanzania*

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What is happening in Tanzania that may affect buildings?

- Little public awareness of energy efficiency
- Rapid economic growth
- Significant urban development
- No standards or labels for energy-efficient products and technology
- No utility energy efficiency programs
- No building codes
- No building construction inspections

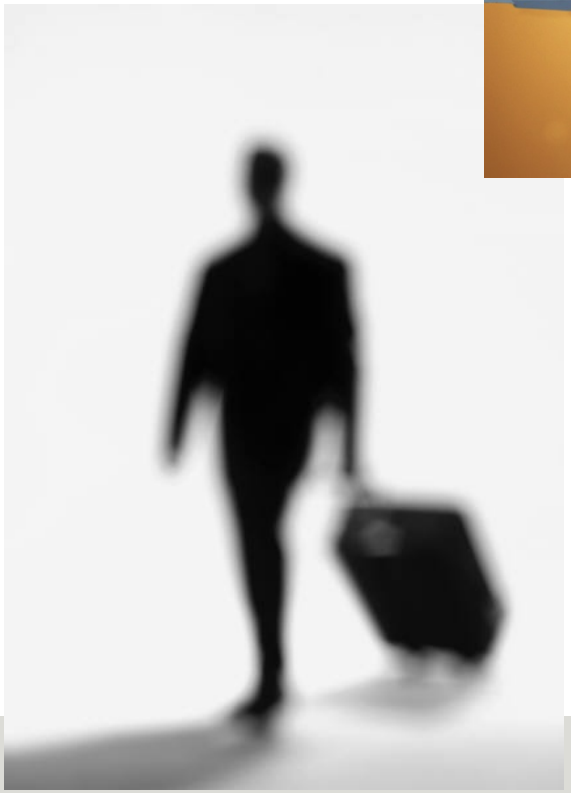
Tanzania – Construction Industry news

Photo by Zuberi Mussa, Reuters

March 28, 2013
Dar es Salaam

14-story building collapse.

Common collapses led to rumors of corruption in the construction industry and speculation of poor quality materials.



WORLD GREEN BUILDING COUNCIL

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World Green Building Council

www.worldgbc.org

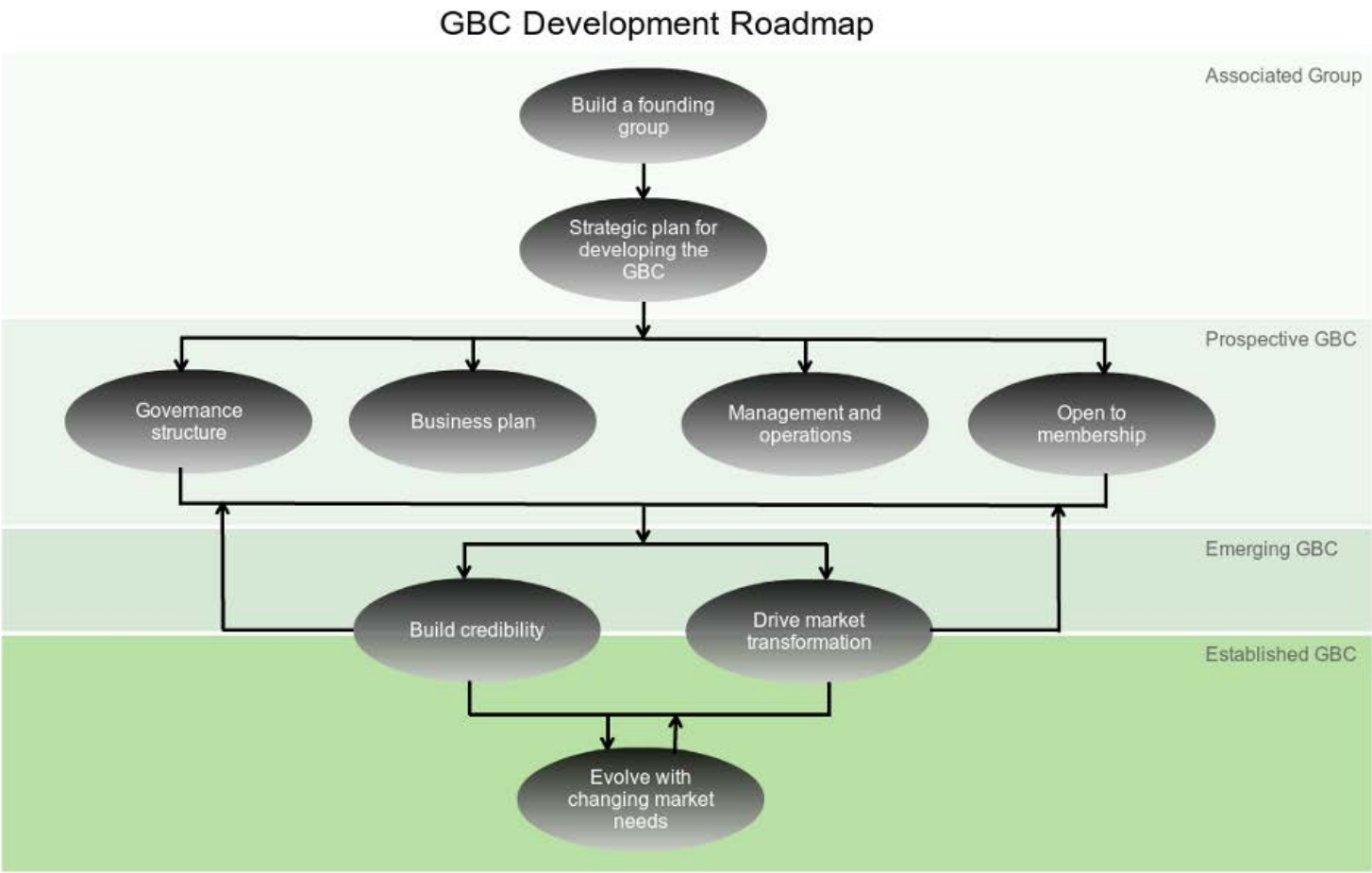
RESOURCES

- Network
- Roadmap for starting a GBC
- Support to create partnerships and collaborations
- Recommendations for working with government and stakeholders
- Reports and studies

Opportunity

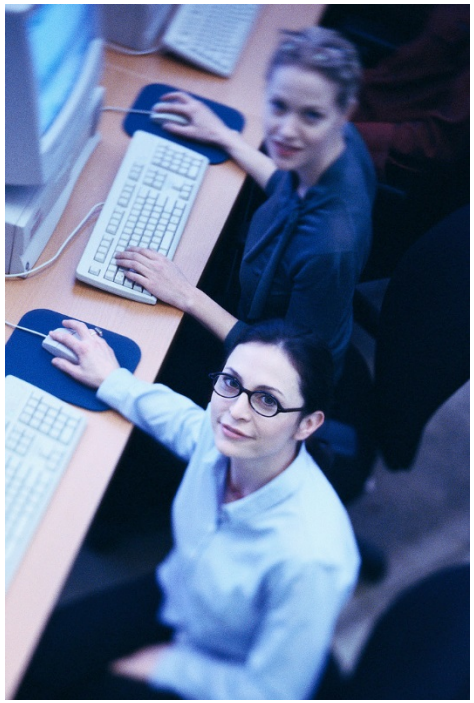
- Tanzania GBC officially launched January 31, 2014 by the Association of Consulting Engineers Tanzania (ACET)
- Created as an open-forum for stakeholders
- Stakeholder support
  - National government: Ministry of Industry and Trade/Tanzania Bureau of Standards
  - Construction Organizations: National Housing Corporation
  - Academia: Ardhi University
- Priorities
  - Establish itself as a sustainable organization
  - Engage additional stakeholder and develop coordination

Establish a sustainable Green Building Council



Typical Activities of a Country-Specific GBC

- Country-specific rating and certification schemes (examples: LOTUS/Vietnam, Green Mark/Singapore, Green Star SA/South Africa)
- Database of locally-available green appliances, products, materials, and services
- Training and education
- Member-based fees/marketing



What should a green building be… in Tanzania?

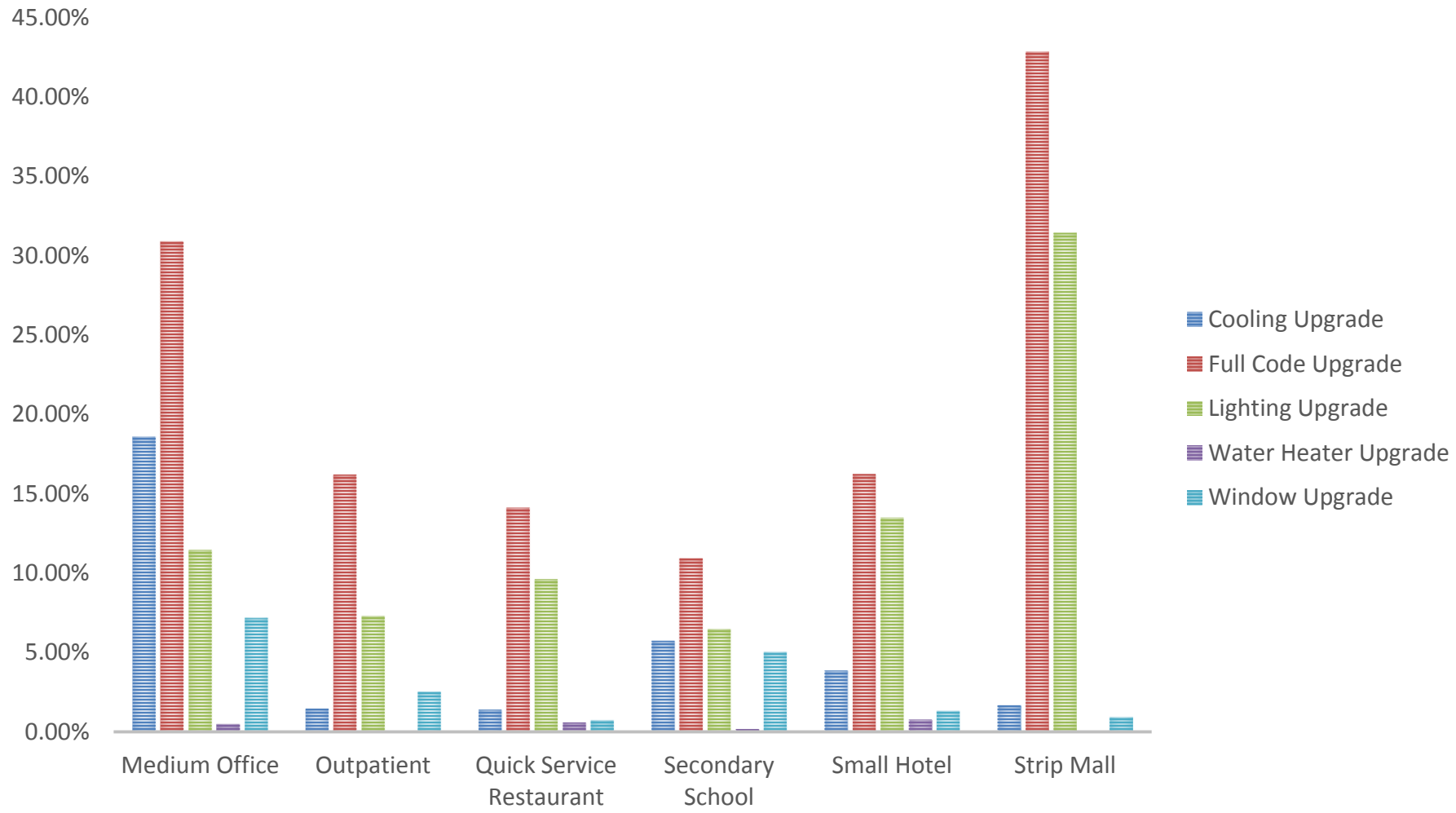
Building Sector Analysis

- Building Types:
  - Medium office
  - Outpatient (small hospital)
  - School
  - Quick service restaurant
  - Strip mall
  - Small Hotel
- Baseline:
  - Equivalent to typical buildings in Dar-es-Salaam
- Upgrade:
  - ASHRAE 90.1-2004 efficiency standard

Energy Technology - List of Simulated Measures

- Electric water heater upgrade - 0.8 EF to 0.9 EF
- Window upgrade – 0.54 SHGC to 0.25 SHGC
- Cooling equipment upgrade – Increase in COP customized for each building type
- Lighting upgrade – Decrease in lighting energy intensity (W/m2) customized for each building type
- Full code upgrade – assumed to incorporate all energy efficiency measures listed above plus others

Energy Savings (%)



Renewable Energy Analysis

Assumptions

- 10% of reference building rooftop area is available for solar thermal and PV systems.
- Tanzania annual solar insolation is 2100 kWh/m^2.
- Electricity costs $0.07 USD per kWh.
- Solar thermal systems
  - convert 40% of solar insolation into utilizable energy;
  - don’t displace more than hot water energy use
- Photovoltaic systems
  - convert 10% of solar insolation into electricity;
  - don’t displace more than ASHRAE 90.1-2004 reference building

Objective 3 Results

	Demand for Solar Hot Water (kWh)		Demand for PV (kWh)	
Building Type	Baseline	Code Upgrade	Baseline	Code Upgrade
Medium Office	6,319	5,636	1,203,908	830,475
Outpatient	7,892	7,033	1,895,703	1,587,956
Quick Service Restaurant	15,281	13,606	269,653	231,056
Secondary School	71,478	63,556	4,406,181	3,924,006
Small Hotel	69,219	61,547	915,839	763,531
Strip Mall	-	-	690,825	394,786

Renewable Energy and Energy Management System (EMS) – Savings Summary

Building Type	Saving Potential % of Water Heating Bill with Solar Hot Water	Saving Potential % of Total Electricity Bill with PV	Saving Potential % of Space Cooling Bill with EMS
Medium Office	100%	3%	16%
Outpatient	100%	2%	16%
Quick Service Restaurant	100%	2%	16%
Secondary School	100%	6%	20%
Small Hotel	100%	2%	17%
Strip Mall	N/A	6%	12%

Identify and Understand Stakeholders

Who are the relevant stakeholders:

What are the drivers?

What do they need?

What stakeholder activity can be leveraged?

Public Service Pensions Fund (PSPF)

- Major real estate investor
- Multi-use and residential apartments for med/low-income
- Interested in taking action in PSPF's existing buildings

Watumishi Housing Company Ltd

- Building 5,000 low-income homes (SF and duplexes) in next 5 years
- Consortium includes investment institutions and 10 banks

What stakeholder activity can be leveraged?

Tanzania Electric Supply Company Ltd. (TANESCO)

- Major electric utility
- Understand obstacles and opportunities in the building sector for efficiency and green
- Developing customer program offerings to increase efficiency

Ardhi University, School of Architecture and Design (SADE)

- University directive to train, consult, and conduct research
- Staff and student interest and commitment to green design