


igg universitätbonn

## Urban Planning in the Age of Urban Energy Transition: What is going-on in Mega-city Dhaka, Bangladesh?



**FIG Working Week**  
17 - 21 May, Bulgaria  
From the wisdom of the ages  
to the challenges of modern world  
SOFIA 2015

**Sujit Kumar SIKDER & Prof. Dr.-Ing. Theo KOETTER**  
Department of Urban Planning & Land Management (PSB)  
Institute of Geodesy and Geo-information (IGG)  
University of Bonn, Germany


FIG Working Week – 2015, Sofia, Bulgaria

igg universitätbonn


## Contents

1. Background & Motivation
2. Study Justification
3. Methodology
4. Case of Dhaka
5. Concluding remarks

FIG Working Week – 2015, Sofia, Bulgaria



## Background & Motivations



- Research interest in the issue of Climate Change and energy to inform **Urban Planning** scholarship **triggered** by two international report (Keirstead et. al. 2009)
  1. *World Population Prospect (UN, 2008): 'World is going to be 'Urbanized'*
  2. *World Energy Outlook (IEA, 2008): 'Urban area consume 2/3 of primary energy'*


According to Wilson (2013):

*....." The relationship between energy consumption and patterns of physical development is enjoying a resurgence of interest and study within urban planning after a long hiatus."*


- **Integrated planning can save upto 20-50% energy cost** (Kanters & Horvat, 2012)
- **Participation of developing countries is very crucial** in order to stabilize long term **GHG concentrations** without compromising sustainability (Blanford et al., 2009; IPCC, 2007).
- **Green growth trend** besides urban adaption is a priority for **developing countries** such as Bangladesh (IPCC, 2007; FAO, 2008; Global Risk index 2012; Offer, et. al. 2011)

3

FIG Working Week – 2015, Sofia, Bulgaria



## Background & Motivations



- The topic is not new line of inquire (e.g. Stoeglehner, et al. 2011; Wilson, 2013) **but the context of developing countries**
- **Only few systems incorporating energy issue in urban planning.** A good number of studies have concentrated more on individual energy sources, life cycle approach; therefore an integrated approach is possible and necessary (Mueller, 2010; Yeo, et al. 2013 )
- **Neighborhood Sustainability Assessment Tools** (e.g. LEED-ND, DGNB, BREEAM ) are having **barriers: voluntary state, economic burden, complexity and ambiguity** (Sharifi & Murayama, 2013, Riera Pérez, 2013 Hamedani & Huber, 2012).

4

FIG Working Week – 2015, Sofia, Bulgaria

igg universitätbonn

## Justification (Neighborhood in Focus)

5

A neighborhood is

- a **good starting point** to create a truly sustainable community
- the **frontlines** in the battle for sustainability
- where land development takes place with **new buildings and facilities** are constructed

Source: OECD (2001) illustrated by Hamedani & Huber, 2012, Choguill (2008)

FIG Working Week – 2015, Sofia, Bulgaria

igg universitätbonn

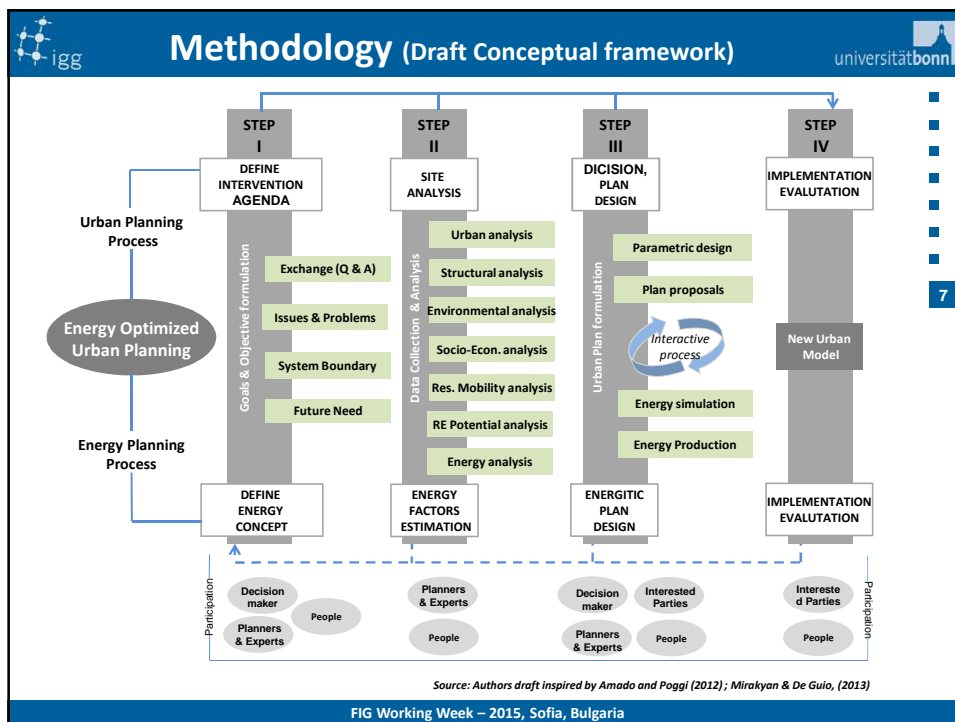
## Justification (Urban & Energy Discourse)

- **Urban density and transport energy consumption** (Newman and Kenworthy 1989)
- **Towards low energy cities** (Reiter & Marique, 2012)
  - I. Residential Building Energy Consumption
  - II. Transport Energy Consumption of Residents
- **Urban project fields for identifying energy-efficient measures** (Webster, 2007)
  - I. Building engineering (level: the single building),
  - II. Utility services (level: the single building, neighborhood, city as a whole),
  - III. Urban planning (levels: binding land-use plan, urban redevelopment),
  - IV. Traffic (level: city as a whole)

6

**“..... We must stress the need to include energy-conscious strategies at every stage of planning process”** (Vandevyvere & Stremke, 2012)

FIG Working Week – 2015, Sofia, Bulgaria



**Methodology (Data & method of analysis)**

The slide includes a photograph of two individuals in a meeting setting, one pointing at documents on a table.

- 15 key informants (e.g. official, planner, architect, developer...)
- Critical review of secondary sources
- Systematic coding: MAXQDA software package
- Actor mapping: Mind tool

FIG Working Week – 2015, Sofia, Bulgaria

igg universitätbonn

## The Case of Dhaka City

Example: Residential Neighborhood Planning & Development

LAT: 23.9D and Lng: 90.5D (UTC +6.00)

FIG Working Week – 2015, Sofia, Bulgaria

igg universitätbonn


## Urban context: Dhaka

- The population of **Bangladesh will be 200 million (2050)**; within more than half (**58.75**) will live in **urban area** (BBS, 2012 & Offer, et. al. 2011)
- **Alone Dhaka will share 16 million inhabitants (in 138 sq.m area) by 2020** (Williams 2012)


1. Urbanization Trend in Bangladesh (1950-2030)


2. Trend Housing Business in Dhaka (1982-2010)

FIG Working Week – 2015, Sofia, Bulgaria

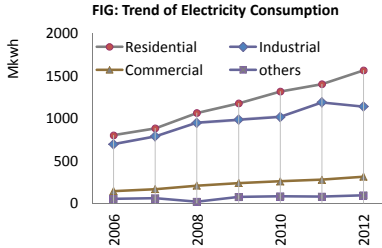


## Energy context: Dhaka






**FIG: Trend of Electricity Consumption**




Source: DESCO, 2012

11




- Residential sector consume **48% electricity** (DESCO, 2012 )
- Daily power blackout, deficit 1000-1200 MW (Kabir et al, 2010 )
- 10% annual increase of energy demand (MPEMR, 2012)
- No building energy code (Parveen, 2012, Alam, 2010)
- Private vehicle dependent mobility (Rahman et al., 2012)

FIG Working Week – 2015, Sofia, Bulgaria



## Residential Development: Dhaka



### Residential Development Type

**1. Formal/Planned**

Private regulation

- Developed land with infrastructure  
- Developed Building

Public regulation

- Developed land with infrastructure

**2. Informal/Unplanned**

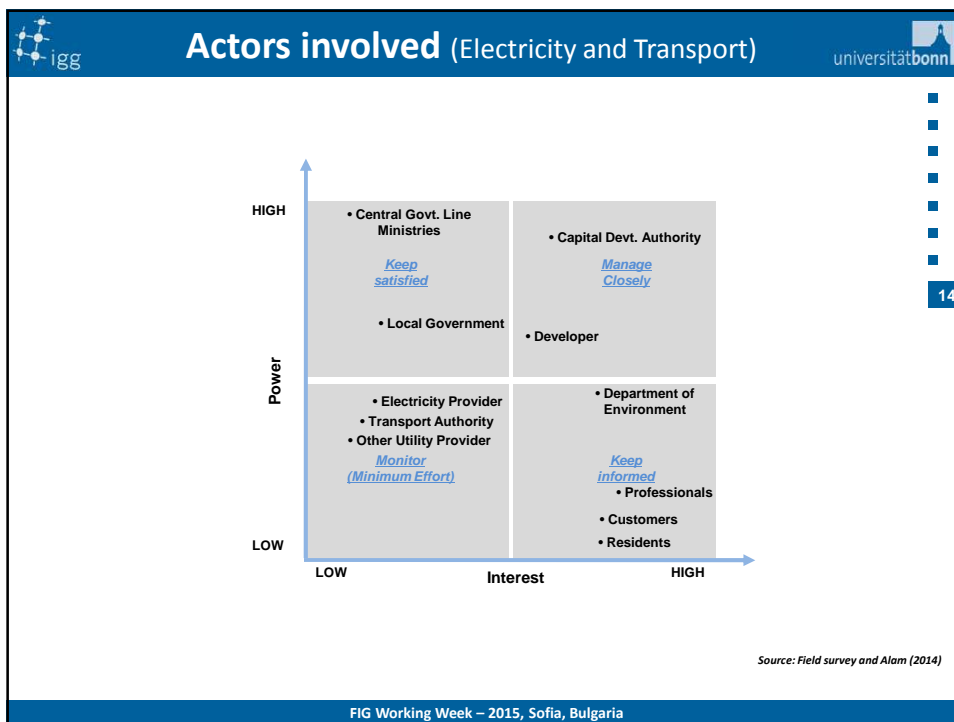
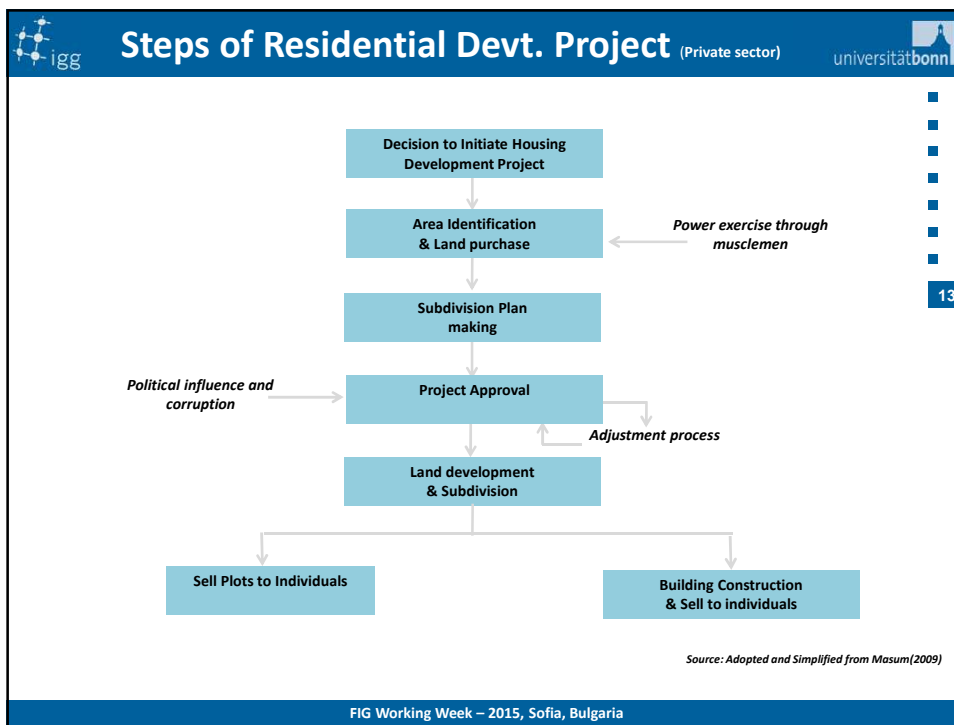
Informal development

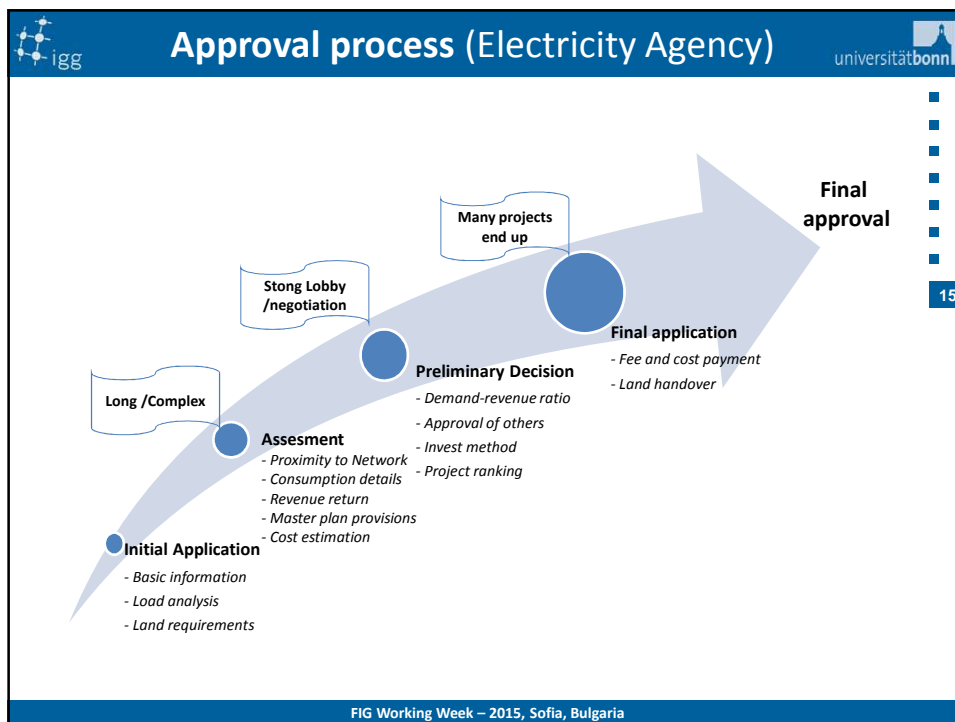
Informal settlements/Slum

**73 %**

Source: Authors draft by following Enemark & McLaren, (2008); Masum (2009); Alam (2014)

FIG Working Week – 2015, Sofia, Bulgaria





### Residential Devt. Projects

- **Total 181 projects has beed identified**
- **17 agencies involved in approval process**

Agency	Applied Project	Approved Project
DESA/REB (Electricity)	No records	Info. could not be collected
DTCB (Mobility)	No records	02
TITAS (Gas)	20	06

16

*Source: Alam (2014)*

FIG Working Week – 2015, Sofia, Bulgaria



igg universitätbonn

## Supportive legal and policy issues

- A. Private Residential Land Development Project Rules, 2004**
  - have provision of Electricity and Transport Agency Approval
- B. Metropolitan Building Constructions Rules, 2008**
  - Introduced Floor Area Ratio (FAR)
- C. National Green Building Code (by IFC under discussion)**
- D. Renewable energy Policy, 2008**
  - to meet 5 % total power demand by 2015 AND 10% by 2020

17

FIG Working Week – 2015, Sofia, Bulgaria

igg universitätbonn



## Challenges, barriers and efforts need

Category	Challenges and barriers (F)	Additional effort need (F)
Governance	16	8
Technical	8	9
Regulatory	11	5

Source: Key Informant interview, 2013

18

FIG Working Week – 2015, Sofia, Bulgaria



## Hopes

In the context of Dhaka city, recent studies explored that

- 1. Roof-top Solar PV Potentials** *(Kabir et al., 2010),*
  - City offers >10 km<sup>2</sup> of bright roof-tops in which nearly 1000 MW/day electricity can be generated with stand-alone PV applications only
- 2. Feasibility of Energy plus buildings** *(Parveen, 2012),*
  - Dhaka is in a favorable position for being successful in wider deployment

19

FIG Working Week – 2015, Sofia, Bulgaria

## Concluding Remarks

- Promising potential of Urban Planning for energy system transition
- Adapt optimal Urban Planning framework with method, models, tools
- Address capacity building, professionalism...
- Meet high quality data gap to support planning and development control

20

FIG Working Week – 2015, Sofia, Bulgaria

igg universitätbonn

**Not a candle light dinner  
But power black out!**



Source: dhakamirror.com , 2009

**Attentive learners during  
power black out!**



Source: Islam, 2011

21

FIG Working Week – 2015, Sofia, Bulgaria

igg universitätbonn

# Danke Thank You


22

**Acknowledgements:**


Department of Urban Planning and Land Management (PSB)  
Katholische Kademische Ausländer-Dienst (KAAD)

*[koetter@uni-bonn.de](mailto:koetter@uni-bonn.de)*  
*[sujit.sikder@uni-bonn.de](mailto:sujit.sikder@uni-bonn.de)*

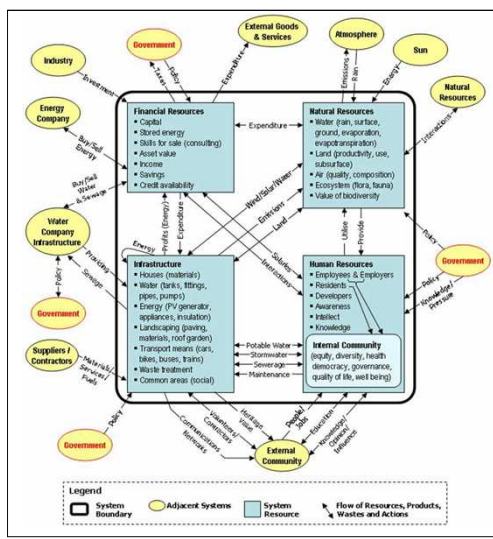
FIG Working Week – 2015, Sofia, Bulgaria



## Urban Housing System: Complex




23




Source: Daniell et al. (2006): <http://press.anu.edu.au/cs/html/ch07s03.html>

FIG Working Week – 2015, Sofia, Bulgaria



## Recent media waves



**Prime-Minister calls for removing power sector subsidies & improve power saving**


How? Who? What?

**70,000 houses install solar systems per month**

মাসে ৭০ হাজার ঘরে সৌরবিদ্যুৎ

Mostly in Rural....Urban!

News article



News article


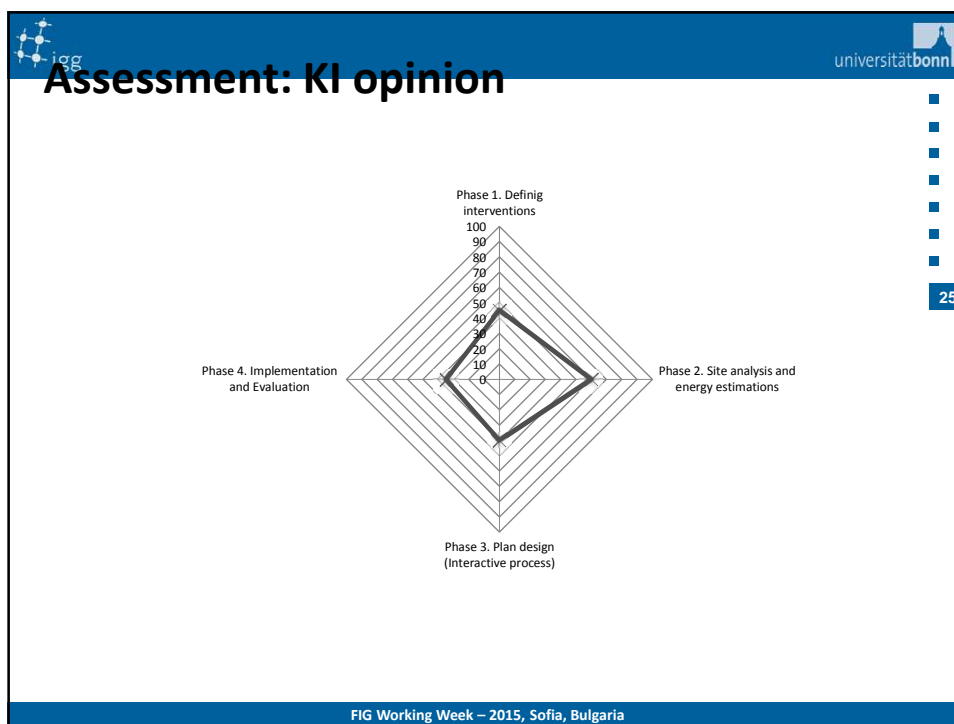


FIG Working Week – 2015, Sofia, Bulgaria



igg universitätbonn

## Challenges

- Lack inter-agency common understanding
- Boundary complexity – data management
- Cheap grid electricity than RE
- Complexity of RE integration
- High initial investment need
- Corruption and political issues
- **Distribution and production dilemma**
- **Ignorance of developers – high housing demand**
- Project end-up with limited or no utility services
- Traditional energy subsidy
- **No building energy code**
- Lack of capacity building
- Weak local government
- **Determination of realistic threshold**
- Complexity of approval process
- .....

26

FIG Working Week – 2015, Sofia, Bulgaria

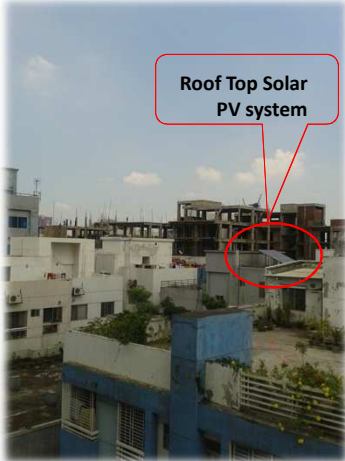
igg universitätbonn

## New Building intervention of Solar - PV

**Ministry of Energy, office order, 2011**

- Required **3% own electricity generation from solar PV** for approving grid connection to new buildings
- **Rental Solar PV system** but do not function after connected to grid

-> Finally, this order has been **abolished (2013)** due to strong lobby and pressure of Developer's association



Roof Top Solar PV system

27

Location: Niketo RA, Dhaka, Source: Own (2013)

FIG Working Week – 2015, Sofia, Bulgaria

igg universitätbonn



28

FIG Working Week – 2015, Sofia, Bulgaria