

# Urban Planning in the Age of Urban Energy Transition - What Is Going on in Mega-City Dhaka, Bangladesh?

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## SUMMARY

The transition of urban energy systems to inform sustainable urban planning scholarship is a popular topic of discussion. The related issues of urban form, energy efficiency and modern technologies have already been studied under different urban configurations and scales. Consequently, the energy integrated urban development policies are being adopted - at least in principal- by several urban authorities. However, this paper explores around the topic of urban planning in the context of energy transition by conceptualizing the case of residential settlement planning process and development systems of Mega city Dhaka are discussed. It is widely accepted that each urban residential project is unique within the general systems approach of sustainability. Such schemes at neighbourhood scale are also good starting point or pre-condition to create a truly sustainable community - because all new buildings and facilities are constructed there. Within the scope of this paper, the questions “what is going on?” has addressed by adopting system analysis approach. All data used from secondary sources and key informant interviews with officials, developers, professionals and experts. The case study found that the urban planning has promising potentials for urban energy system transition even in the context of urban Bangladesh. But there are different identified challenges such as capacity building, professionalism and more others have to be addressed. From the technical point of view, there is a growing need for adopting an optimal urban planning framework along with methods, models and tools. The high quality data gap to urban planning and development control in the age of energy transition also has to be tackled.

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## 1. BACKGROUND TO URBAN PLANNING AND ENERGY TRANSITION

The definition of urban planning varies both in the literature of academic and practical world. It is a combination of science and an art since emergence in late nineteenth century (Hall, & Tewdwr-Jones, 2010, Freestone, 2000). At the local level, urban planning also overlaps with environmental planning and urban management. However, the possibility of integrating the science and applications of planning is always a challenging task. On the same path, the energy transition is holistic proposal for solution to the challenges of low energy consumption and continue growth. Nevertheless, the energy transition also considers strengthen social justice, technology and many more innovative solutions of renewables and energy efficiencies (Morris & Pehnt, 2014). All together energy transition also demands comprehensive and interdisciplinary actions. From the build-environment dimension of energy transition, urban planning has three levels - such as i) building, ii) neighbourhood and iii) city or region. Reiter & Marique, (2012) emphasize on both i) building energy use, and ii) transport energy consumption for planning low carbon urban transition. Afterwards, the planning tasks become highly complex (Mohanty, 2012). The neighbourhood sustainability assessment rating system (i.e. LEED-ND, DGNB) addressed energy issue but most of them are suffering from manifold barriers of voluntary state, economic burden, complexity, subjectivity and ambiguity.

The efficient planning for urban systems is already complex which need to meet a long term vision and ensure the balance among different sectors, resource efficiency and stakeholders (Batty, 2009). Whereas urban energy system is a socio-technical system which combined the processes of acquiring and using energy but challenged today by paradigm change of fossil dependency (Keirstead, et. al. 2009) (REN21, 2013). In this contrast, urban energy planning should follow a holistic approach, which deals with the alternative decision making process by appointing optimizations, simulations and suitability measures (Stevanović, 2013). This similar fashion of holistic planning process should therefore also consider integrated urban planning concerns. Therefore, Dosch & Porsche, (2010) highlighted Urban Planning as one of the promising frontiers about resource constraints and environmental impacts.

Urban planning process should be included energy-conscious strategies at every stage from the early design process (Vandevyvere & Stremke, 2012). The frameworks exists to support comprehensive planning procedure differ based on specific context, goals, scale. However, most common planning process has four main stages activities especially urban residential neighbourhood scale. In the next section, a case study is presenting on Mega city Dhaka where urban residential settlement planning process and development system are discussed in the light of energy transition.

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## 2. A CASE ON DHAKA CITY

An emerging megacity such as Dhaka is one of the instance of complex and dynamic systems that might be represented the interactions between socio-economic and environmental processes at both local and global scale (Kötter, 2004). Dhaka is expected to be the highest urban concentration in Bangladesh and said to become the world's third largest Mega city by 2020 which has a current population about 13.4 millions - i.e. 38% national share of urban population. The total city has about 1,460 sq.km planning area and topographically surrounded by low-lying flat lands ( BBS, 2012, UN-Habitat, 2009). Since the end of 16th century, the city has experienced several urban development and expansion exercises under different governance regime.

### 2.1 A brief overview of urban planning

Dhaka is still following the same planning hierarchy of British initiated colonial urban planning system. After independence, the first master plan was enacted in 1993 and lately Dhaka Metropolitan Development Plan (1995 -2015) which already created huge debate.

Map 1: Strategic Planning Zones (SPZs) of Dhaka



Source: Saha, 2012, Google, 2014, RAJUK, 1995

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Due to huge pressure of urbanization, the city is expanding in both vertical and horizontal direction by following mostly informal pattern (Nahrin, 2008; Parveen, 2012). In this background, Kabir & Parolin, (2010) highlighted need for comprehensive action to recognize the allocation of activity development control. However, both private and public formal urban development has almost same pattern as land development or residential township projects (Parveen, 2012). After site development, the land area is simply divided into almost symmetric plots and allotted for residential and commercial activities.

## **2.2 Residential settlement development along with energy constraints**

The informal residential settlement typology is significant, only about 27% are developed under the provision of formal regulations (Masum, 2009). Due to continuous urbanization and acute housing demand, the housing business has grown progressively in last 20 years. The land market related issues and increased number of nuclear families also have played significant roles (REHAB, 2012). The housing demand may prolong or even may raise in coming years – by 2020 more than five million new population needs to be accommodated in Dhaka (Parveen, 2012). On the other hand, the transformation of residential quality in the existing formally developed residential settlements are also deteriorated (Nahrin, 2008; Nilufar, 2010). The changes and violations in terms of building use, land use and population density have also serious impact on energy consumption related factors in both inter-neighbourhood and other surroundings. National energy demand increase by 10%, the residential sector of Dhaka city alone consumes 48% of total electricity consumption. The city has a total peak electricity demand only 2000MW but the power blackout on regular basis is a common phenomena which cause manifold sufferings for urban inhabitants (DESCO, 2012, Kabir, et al., 2010). Apart of energy generation, the existing planning and building regulations do not consider the energy consequences rather focused on density and development control (Alam, 2014; Parveen, 2012). Due to insufficient public transport the personal transportation is highly dependent on private vehicle (Rahman, et al., 2012). In addition, the difficulties of traffic management also contribute to higher time, comfort level and energy use.

## **2.3 Stakeholder analysis of residential development business**

Both public and private sector are involved in residential settlement development projects in Dhaka city. The site and services approach is the common fashion of residential land or housing development. But the difference remains in terms of land supply and approval process. The public sector only need land acquisition approval but the private sector purchase or grab afterwards obtain approval from the Capital Development Authority (RAJUK) for selling them to the end users (Alam, 2014; Masum, 2009). Up to 2012, the total number of registered private developers in Dhaka city are 108; besides, more informal developers are doing small-scale projects. RAJUK is the central actor for regulating residential settlement development projects, but there are 16 more related organizations. To this end, it remains as an important challenge in terms of urban stakeholder's participation due to varied interest and power relations, management strategies and working approaches of different agencies. The role of the local government is very important for urban planning in relation to energy transition but in the context of Bangladesh it is not much visible yet. Apart from the

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organizational actors, the targeted customers and affected residents, are having higher interest for affordable housing - but due to huge demand and limited supply of housing - they have almost no negotiation power; their level of participation in the planning and development process also remains at lower co-ordinate. Due to problems in approval process, many projects are even ended up and handed over to the end-user with very limited or no provision of utility services. Even responsible electricity and transportation regulatory agencies do not maintain or share any record about the application and approval of residential settlement development projects.

## **2.4 Regulatory framework in place**

Inefficiency of law and regulation to support energy dynamics is a major obstacle of sustainable urban transition. In contrast, like many other cities of developing countries the present planning and building regulations of Dhaka city mainly focused on density and development control related issues; rather urban development and building construction practices (Parveen, 2012). The regulatory framework of residential settlement development projects approval process is long and difficult one as there are many open, overlaps and loopholes in the regulations. In contrast, often it is claimed that many developers are bypassing somehow as a way to relieve from such drawbacks. There are 181 residential settlement development projects exist in greater Dhaka city area. Several sources confirm (i.e. Alam,2014) that only few projects could meet the formal planning standards and development regulations including energy issues. Moreover, there are almost no prescribed steps or process how to evaluate the public sector housing/land development projects.

## **2.5 State of individual planning steps**

In context of Dhaka city, this study has conducted a systematic assessment to realize the current state of planning especially in case of residential settlement development projects. The final result shows that the site analysis and energy estimations have gained relatively higher (50%) average aggregated rating by key informants. In current practice, the energy estimation activities are performing only very basic level in comparison to urban site analysis issue. The goal formulation, alternative plan making and monitoring steps achieved only 40% rating. However, the overall rating of planning activities have huge deficits in urban planning process to support urban energy transition.

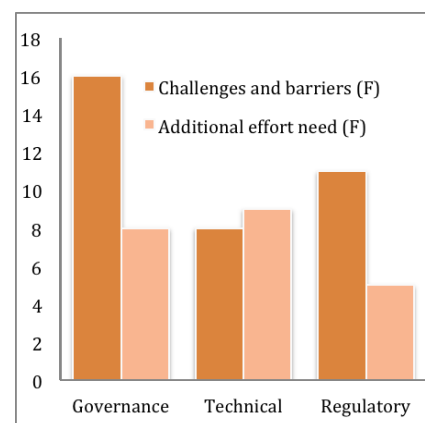
## 2.6 Use of methods, models and tools

A good number of methods, models and tools are available for realizing energy transition in urban planning process. But the poor use of different methods, models and tools is one of the significant challenges, as most of the models and tools always demand an extensive updated database support. In the context of Dhaka, even the physical development control, which hampered due to insufficient exercise of regulation, shortage of skilled manpower, absence of database management system and lack of new technology/tools adoption. The urban planning and management are using few methods and tools such as GIS & RS for development planning and topographic survey. But most of the initiatives are active on temporary project basis. The electricity companies and transportation are also progress in digitalization and planning tools adaptation but still very basic and broader scale. The urban planners, architects and other environmental professionals are using some advance methods and tools but on informal and voluntary basis.

## 2.7 Assessing the way forward

It is important to identify challenges/barriers and future additional efforts need for urban planning in relation to energy transition. The empirical findings could be grouped under three broad categories such as governance, technical and regulatory. The governance related challenges/barriers highlighted prominently but interestingly the future efforts need related response remained at lower frequency; because the challenges are mostly general issues. The regulatory related challenges/barriers are mentioned as limited workability, very basic, unclear, overlapped and re-adjustment need. Some research already confirmed that the technical potentials of solar PV energy ( i.e. Kabir et al., 2010) and passive buildings (i.e. Parveen, 2012) are very high in mega city Dhaka. The technical challenges/barriers can be mentioned as traditional energy subsidy, cheap grid electricity, high initial investment, integration complexity of clean energy, huge housing pressure, boundary complexity and energy distribution-production dilemma. In response, the need of technical efforts highlighted as determination of realistic thresholds, recognition of energy dynamics, and integration of energy concept at the early design stage in urban residential settlement development projects.

Figure 1: Key informants response



Source: Key informant interview, 2013

### 3. CONCLUSION AND OUTLOOK

The urban planning is a growing concern for progress towards green economy and energy transition in rapidly urbanizing mega cities of developing countries like Dhaka. Of course in energy transition context, the priority for Bangladesh is to be addressed: i) energy security, and ii) access to energy for all. But the urban planner has potential role for triggering multi-level aspects that is already a long discussed topic in their professional practice. However, the urban planning and development need to ensure for future efforts in terms of governance, technical and regulatory issues. The need for capacity building, strong local government, supportive private sector and balance between public-private sectors are frequently mentioned as governance viewpoint of urban planning and energy transition. The need for regulatory efforts such as clear regulations for housing projects, review of planning-control instruments, and re-adjust of laws and rules. From the technical point of view, there is a growing need for adopting an optimal urban planning framework along with methods, models and tools; the high quality data need has to be tackled. The future research should be identified models and tools that could reduce complexity for energy optimized urban planning.

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