FUTURE PROOFING
INDIAN
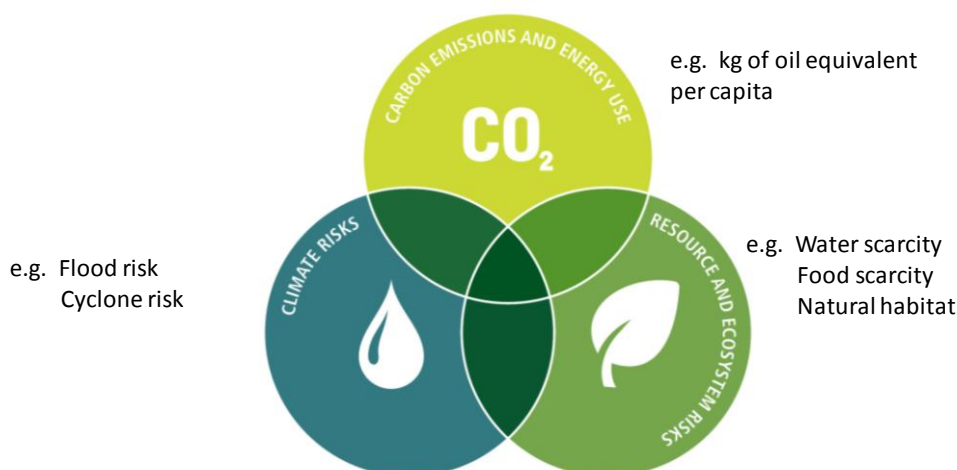# CITIES

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Project Summary

Background

The challenge of how to promote growth and poverty alleviation while avoiding irreversible and costly environmental damage will largely be played out in cities in Asia and Africa. These cities continue to have significant numbers of people living in poverty and are particularly vulnerable to climate hazards such as flooding and cyclones and to the risks associated with unsustainable high carbon, high energy use pathways**.**

Atkins in partnership with the UK Department for International Development (DFID) and University College London (UCL) have worked closely together over the last year to develop a new integrated approach to urban development – Future Proofing Cities (FPCs)[1] – focused on helping cities in the developing world respond to the risks[2] associated with climate change and resource scarcities in way which reduces urban poverty and catalyses economic development.

The 'future proofing' approach has gained traction with a range of cities and international agencies including the World Bank, Rockefeller Foundation, Cities Alliance, and ICLEI. DFID are also keen to use the approach to inform the deployment of climate finance relevant to cities in South Asia (including India).

As part of the Future Proofing Cities report, 59 Indian cities were assessed based on the environmental risks to their economic and social prosperity. This analysis showed that Indian cities face a wide range of environmental risks from climate hazards (e.g. flooding) to the risks associated with locking in unsuitable high carbon, high energy urban infrastructure (e.g. energy security, congestion, air pollution, future carbon price risks). The analysis also shows that cities in India remain highly vulnerable to these risks. Within the 59 cities assessed, our estimates suggest nearly 70 million people still live in multidimensional poverty, leaving a significant number of people highly vulnerable to the stresses and shocks associated with climate hazards, resource scarcities, and degradation of ecosystems on urban fringes such as forests.

Figure 1.   Integrated Risk Assessment Framework
Looking at the intersection between mitigation, adaptation, and resource productivity

e.g. kg of oil equivalent per capita

e.g. Flood risk
        Cyclone risk

e.g. Water scarcity
        Food scarcity
        Natural habitat

The good news is that cities can act to future proof themselves, and acting can generate economic and social benefits, as well as environmental ones through measures such as integrated urban planning, diversifying the economy away from climate sensitive sectors, sustainable transport, management water and waste, new sources of energy, and new building design. Moreover, at the level of the city, many policies can respond to multiple environmental risks. For example, buildings can be designed to reduce carbon emissions and energy use, and to be resilient to climate hazards such as temperature extremes.

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[1] Future Proofing Cities: Risks and Opportunities for Inclusive Urban Growth: Atkins in partnership with University College London (UCL) for the UK's Department for International Development (DFID).
2 We define risk broadly as the potential that the 'activities' of cities which drive carbon emissions and pressure on critical natural resources and ' events' in the form of climate hazards and external pressures on resources used by cities will have an undesirable impact. Given that cities both contribute to and are impacted by environmental risks it is difficult to disentangle cause and effect. Hence, no attempt is made to delineate between stresses or risk drivers (e.g. carbon emissions) and shocks (e.g. rises in the price of energy, climate hazards).

Project objectives and outcomes

This one year project will work closely with city and local stakeholders to apply the Future Proofing Cities approach to two cities in India: Bangalore and Madurai. The objective of the project is to support the development of future proofed urban development strategies and investment plans in Bangalore and Madurai. The longer term objective is to reduce urban poverty and catalyse economic development in both cities by supporting the identification and implementation of investments which generate environmental, social, and economic benefits.

Through piloting the approach, the wider project objectives are to:

- Demonstrate to other cities approaches and lessons for future proofing their urban development
- Inform the scaling up and deployment of international financing for climate change

Key outcomes of the project will be:

- An improved evidence base on the range of environmental risks and responses which can generate wider environmental, social and economic benefits within the cities.
- Improved awareness and capacity in each city to respond to risks.
- Improved coordination, collaboration and mobilisation of key city stakeholders in identifying and developing options for future proofing.

How this work fits with the partner cities

Bangalore and Madurai showcase some of the challenges facing large and lower tier cities. They both face significant environmental risks to their future prosperity. The project will build on strong existing momentum for action. The two cities span different urban types in the Atkins-UCL Future Proofing report based on the most significant environmental risks they face. The cities also differ in their current response to risks based on the strength of their urban economies, governance, planning and delivery capabilities, providing opportunities to better understand how varying capacity shapes policy responses to future proofing.

Bangalore already has relatively high carbon emissions and energy use, and risks further locking itself into a high carbon, high energy pathway unless it takes action now to future proof. Research by the Indian Institute of Science (IIS) suggests that Bangalore has the third highest carbon footprint in India and a rapidly rising energy use, primarily down to electricity consumption relating to buildings. Transport networks in the city are also heavily congested and most travel is by motorised modes. The city also has significant emerging risks to its water security.

Bangalore is a large and rapidly growing city with significant global connectivity with a State government committed to deliver action on the ground. Bangalore is at an important moment in revising its masterplan for the city and associated infrastructure programmes. In 2012 the Bangalore Development Authority embarked on revising its Masterplan for 2031.

Madurai contrasts with Bangalore in terms of the nature of the risks it faces and in terms of its size and response to risks. Madurai's population is due to double in the next twenty years and the city has an important opportunity to avoid locking itself into an energy intensive, high carbon, sprawled development pathway. Shaping the travel choices of its growing population will be key to this as they look to shift modes from walking to 2/3 wheelers and cars. Madurai is located on the Vaigal River and parts of the city experience fluvial flooding and flooding from storm water run-off which may intensify with increasing climate variability. Madurai also faces risks to regional support systems within the city catchment: water security is an emerging issue and there are pressures on fertile agricultural land and the wetland lake system which is a defining feature of the city and an important ecosystem.[3]

Madurai is undertaking a review of its Masterplan for the city to extend the period for growth. A key priority for local stakeholders is to integrate action between sectors. Madurai - in common with other lower tier cities - has more limited capacity than Bangalore to address the key risks facing the city and the project can help to strengthen the approach.

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[3] For example the lake and wetland system around Madurai which forms part of the drainage system and water supply for the city is experiencing encroachment from development and pollution of water sources due to a lack of infrastructure being provided to new development areas. Unmanaged development in peri-urban areas is impacting on fertile agricultural land. In addition Madurai also experiences issues with fluvial flooding.

Approach to the study

The project will be led by a core delivery team from within Atkins, UCL, and IIHS with world class research, country, and thematic expertise. This will be supported by senior level technical leadership from Atkins, UCL, and IIHS and a technical expert pool from the wider Atkins network.

The project will consist of five phases which will enable an iterative process of embedding knowledge throughout all stages of the project. Engagement activities will be embedded throughout all stages of the project, including targeted 1 to 1 interviews and small focus groups around specific issues, participatory workshops with project stakeholders and the use of 'action groups' to identify, develop, and implement options for future proofing.

Figure 2 summarises the five phase approach, as well as the project deliverables for each, with further details on the outputs.

Figure 2.   Summary of Approach

	ACTIVITIES	STAKEHOLDER ENGAGEMENT	DELIVERABLES	
OUTPUT 1: INCEPTION PHASE	Review work programme and M&E framework	Validate and generate demand with senior policy makers Early identification of 'champions'	Finalised work programme and M&E framework	MAR TO APR 2013
OUTPUT 2: URBAN DIAGNOSTIC	Review of evidence and priorities for future proofing Stakeholder mapping	1-to-1 discussions around priorities Early identification of 'action groups' Launch workshop to identify 2-3 strategic priority areas Formation of 'action groups' around priority areas	City diagnostic and priorities for future proofing	MAY TO JULY 2013
OUTPUT 3: ACTION PLAN FOR FUTURE PROOFING	Identify and appraise long list of policy options for future proofing Develop and assess potential impact of short-list of policy options	Engagement with 'action groups' to define and short-list options Meetings with key decision-makers	City action plans	AUG TO DEC 2013
OUTPUT 4: REPORT – FUTURE PROOFING INDIAN CITIES	Draft report capturing lessons learnt	Engagement with city, state, national, international decision-makers to feed into report	Report: Future Proofing Indian Cities	JAN TO MAR 2014
OUTPUT 5: KNOWLEDGE MANAGEMENT & DISSEMINATION	Report dissemination Report launch CDKN Policy Brief	Engagement with city, state, national, international decision-makers to communicate findings	Knowledge management strategy Summary of activities	MAR TO JUN 2014

Output 1: Inception Phase

This stage will be used to mobilise the project team and to finalise the project workplan, scope, methodology, detailed monitoring and evaluation framework, approach to stakeholder engagement, and review processes. A stakeholder mapping exercise will be undertaken of (i) senior policy makers at national, state, and city level (ii) potential 'champions' across the public/private/third sectors committed to supporting the city to respond to identified risks; and (iii) groups particularly vulnerable to risks such as flooding and rising energy prices.

The project team will initiate the process of validating and generating demand for the project with stakeholders. For example, the project team will hold a range of meetings with senior level policy makers in Bangalore and Madurai discuss the objectives of the project, gather views on the proposed outputs, outcomes, and methodology, identify early 'champions,' and gain further views on priorities for future proofing, knowledge management, and next steps.

Output 2: Top level urban diagnostic

Based on existing evidence and data (including geospatial data), this stage will provide a top level assessment of the risks facing each city (carbon/energy, climate hazards, and resource/ecosystem risks), the vulnerability of people, buildings and infrastructure to these risks, and the capacity (and incentive[4]) to respond to risks, as well as how projected growth dynamics will shape future building and infrastructure demands and impact identified risks out to 2031.[5]

Risks and vulnerabilities will be analysed and presented spatially. If feasible, data from existing climate scenario models will be drawn upon and combined with an assessment of future vulnerability to consider the potential climate change impacts at city level. Building on the inception stage, this stage will refine the stakeholder mapping further including identifying the responsibilities and core capacities of key organisations to respond to identified risks. This phase will provide an early indication of potential strategic priority areas for future proofing based on the severity of risks and the vulnerability and capacity of the city to respond to those risks.

Output 3: City Action Plans for future proofing

City Action Plans will be developed in partnership with relevant stakeholders focused on generating momentum for early action around 2 key priority areas. Action based research involving interviews and focus groups with key stakeholders and identified 'champions' will be used to refine and validate identified priorities for action.

A workshop will be held in each city to review the initial diagnostic work and agree on 2 strategic priorities around which 'action groups' can be formed to work with the project team to identify and develop options for future proofing in further detail.

This stage will review the impact of existing policies, programmes, and projects in each priority area based on desk-top review and consultation with 'action groups'. An initial long list of policy options for future proofing in each priority area will then be developed and refined by sector specialists (e.g. low carbon transport, water management).[6] These policy options will be a mixture of spatial interventions to address risks in particular neighbourhoods/areas of the city (e.g. bolstering climate resilience in informal settlements) which can be scaled up and more systemic interventions (e.g. a range of mutually reinforcing mass transit options).

The long list of options will be qualitatively assessed using five key criteria – the extent to which they: (i) address identified risks (including multiple risks to generate 'win-win' and 'triple win' environmental benefits) (ii) target specific vulnerabilities and reduce urban poverty (iii) catalyse economic development; (iv) can be implemented (given existing plans, capacities[7] and incentives to act); and (v) link to and reinforce other policies.

Further engagement will be used to validate the long list and short-list 2-3 options for further appraisal and consideration.

These short-listed options will be defined in further detail and drawing on the latest global researcha summary provided of their potential (cumulative) environmental[8], social, and economic impacts and likely ease of implementation.

Potential sources of finance and delivery vehicles for these interventions (covering public and private sources, including climate finance) will be identified and a draft action plan produced, including exploration of how the benefits of the action plans can be monitored and evaluated by relevant city stakeholders. High level decision makers will help guide how the actions can be implemented and embedded within existing planning processes and strategies.

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[4] An assessment of the key issues acting as 'incentives' to act will be explored (e.g. for many cities it is energy savings or avoiding the damage costs from regular occurrences of flooding which provided an incentive to future proof.

5 The standard planning time horizon for both cities

[6] For each priority area a further rapid assessment of risks, vulnerabilities, and capacity to respond to risks may be undertaken to inform the identification and development of policy options.

[7] This assessment will cover 4 key criteria: affordability, governance and planning requirements, and deliverability

[8] See FPCs page 103.

Output 4: Future Proofing Cities in India Report

This phase will result in a final report for publication focusing on (i) the benefits a 'future proofing' approach can bring to assessing and developing responses to risks (ii) key findings from applying the approach to Indian cities with different risks and capacities; and (iii) lessons for other cities in India and more widely.

The report will be focused and aimed at (i) National and State level agencies (e.g. MoUD, State Urban Development Ministries and delivery bodies) (ii) key funding agencies (e.g. DFID, World Bank); and (iii) Urban Local Bodies (ULBs) and other city stakeholders.

Output 5: Knowledge management and dissemination

Knowledge management and dissemination will be embedded throughout the project to maximise the impact of the project. Key audiences for the final report (including key regional, national, and international policy makers) will be briefed to promote scaling up and replication.

Project Outputs

Working in partnership with city stakeholders, key project outputs will include:

- **Top level urban diagnostic** for each city covering:
    - The risks from climate hazards, resource scarcities in the wider urban catchment,[9] and carbon/energy use
    - The vulnerability of people and physical infrastructure to those risks
    - The capacity of stakeholders and institutions within the city to respond to risks
    - Potential priorities for future proofing
- **Summary action plan for future proofing** for each city covering:
    - Options for future proofing focused on 2 priorities in each city determined in partnership with stakeholders
    - An assessment of the environmental, social, and economic impacts and ease of implementation of shortlisted options
    - Approaches to financing and delivery, including identifying climate finance sources
- **Summary report on Future Proofing Cities in India** highlighting how a Future Proofing approach can assist other Indian cities in developing future proofed investment and delivery programmes
- **Knowledge management activities** embedded throughout the project to disseminate the findings of the project to City, State (Karnataka and Tamil Nadu), national, and international stakeholders.

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[9]The diagnostic will look at the issues of water security and potential damage to natural ecosystems (e.g. forests) in the urban catchment. Covering the issue of food security is a political sensitive issue in India and the project team will review how to cover this element during the inception phase.

About the project partners

Atkins

Atkins is one of the world's leading infrastructure and design companies, with the depth and breadth of technical expertise to respond to the world's most complex infrastructure and environmental challenges. These included responding to the increasing rate of urbanisation and the urgent transition to a low carbon economy. Atkins works with municipal authorities, national and regional government, development agencies, private sector companies, and other stakeholders to develop and implement strategic plans and investment projects to shape and manage the future growth of cities. With over 17,000 employees worldwide, Atkins is able to bring together its technical knowledge across a wide range of disciplines such as transport, water, energy, design, architecture, climate science, ecology, planning, and economics to help cities and those investing in them to act upon the long term opportunities and challenges of resource use and a changing climate. We have over 800 people based in India and our international work spans Asia, Africa, Europe, the Middle East and North America. Through our 'Carbon Critical' initiative Atkins has developed a range of bespoke tools to reduce the carbon emissions associated with major urban infrastructure programmes including a low carbon Master planning tool to reduce city carbon footprints currently being applied in India.

University College London, Development Planning Unit

The Bartlett Development Planning Unit (DPU) at University College London is internationally recognised for its academic and professional contributions in relation to city development in the developing world in active collaboration with partner institutions and researchers in the Global South. It is concerned with promoting sustainable forms of development, understanding rapid urbanisation and encouraging innovation in the policy, planning and management responses to the economic, social and environmental development of urban areas, giving emphasis to social justice, participatory local governance and poverty reduction. The key distinctive features of the DPU are its commitment to action research and its focus on rapidly urbanising areas in the developing world. The DPU maintains a wide network of partner organisations in Latin America and the Caribbean, Africa and South and Southeast Asia working on sustainable cities. DPU has strong relationships with the African Centre for Cities and a range of other city focussed organisations across Africa. DPU were a key partner in a recent major new report on the risks and responses to environmental risks in developing countries - 'Future Proofing Cities' - published by Atkins in a unique partnership with the Department for International Development (DFID) and University College London (UCL).

Indian Institute for Human Settlements

The Indian Institute for Human Settlements (IIHS) is an Indian national education institution committed to the equitable, sustainable and efficient transformation of Indian settlements. IIHS is India's first prospective independently funded and managed interdisciplinary National University for Innovation that focuses on its ongoing urban and development transformation. It is a first-of-its-kind, practice and innovation-oriented knowledge institution that seeks to bridge the conventional excellence, scale and inclusion divide. The IIHS provides consulting and advisory services to national and state governments, public, parastatal municipal agencies and private firms the broad area of human settlements and urbanisation. It also serves on a number of Govt. of India and State Government committees and policy fora. Advisory and project inputs are currently being provided to the Planning Commission, Ministry of Urban Development, Ministry of HUPA, Govt of NCT of Delhi and Karnataka. IIHS also provides international and national policy support to the UNDP, UNESCO, UNEP and UNISDR, ADB, the World Bank, UNEP & OECD supported international Green Growth Knowledge Platform. This offering will be anchored by the IIHS's Practice programme. Specific inputs will come from IIHS staff members, advisors and practitioners who have been involved in inputs into the IPCC Assessment Report 5 (AR5), the UNISDR Global Assessment of Risk (2009, 2011 and 2013) and a number of cutting-edge climate and risk assessment, adaptation and mitigation initiatives and training programmes in India

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