



SMART VILLAGES
New thinking for off-grid communities worldwide

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Smart Villages in India: State level workshops report



Workshop Report 27

ODISHA AND JHARKHAND,
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Smart Villages

We aim to provide policymakers, donors, and development agencies concerned with rural energy access with new insights on the real barriers to energy access in villages in developing countries—technological, financial and political—and how they can be overcome. We have chosen to focus on remote off-grid villages, where local solutions (home- or institution-based systems and mini-grids) are both more realistic and cheaper than national grid extension. Our concern is to ensure that energy access results in development and the creation of “smart villages” in which many of the benefits of life in modern societies are available to rural communities.

www.e4sv.org | info@e4sv.org | [@e4SmartVillages](https://twitter.com/e4SmartVillages)

CMEDT - Smart Villages Initiative, c/o Trinity College, Cambridge, CB2 1TQ

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Publishing

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SUMMARY

The latest figures for India, provided by the 2011 census, indicate that 69% of the population (833 million people) live in rural areas, while 31% (377.1 million) reside in urban areas. This situation will reverse by 2050, when 50% of the population will live in urban centres.

There is a widespread consensus that this spatial transition in India poses a huge challenge for achieving the targets of the Sustainable Development Goals by 2030, particularly in respect of providing an adequate infrastructure for the burgeoning urban sector. Furthermore, there is concern that there is a growing disparity between urban and rural India in relation to existing infrastructure, with 300 million Indians, mostly in rural areas, without access to electricity, according to World Bank data. In this situation, a huge potential can be harnessed by bringing in renewable energies, particularly solar technologies, to deal with the unmet domestic demand for electricity.

The Government of India's 'Smart Cities Mission', is a timely intervention that has shifted the focus on improving the condition of India's cities and provides a valuable opportunity for linking sustainability solutions in urban and rural India. The Smart Villages Initiative¹ leveraged the Smart Cities programme to devise two state level workshops to gather a range of stakeholder views. These comprised government officials, academic researchers, executing infrastructure and energy institutions, corporate players, local energy providers, and civil society organisations from across the states of Odisha and Jharkhand. There were also contributions from the states of Bihar and Tamil Nadu, and the cities of Delhi and Mumbai.

¹ Please note that there are three usages of "smart villages" in this report. The capitalised usage of "Smart Villages" refers either to the Smart Villages Initiative based in the United Kingdom or to the Government of India's national Smart Villages programme. "Smart villages" in lowercase is also used throughout to refer to the general concept rather than specific initiatives.

These state workshops provided an opportunity for a cross-sector discussion on a national renewable energy agenda to ensure that there is an integration of renewable energy in both India's 'smart cities' and 'smart villages'. There was widespread interest in ensuring collaboration between stakeholders to achieve a better alignment of objectives and incentives, and ensure that Indian policy-making has a clear focus on sustainability to achieve the Sustainable Development Goals. There is a particular keenness to leverage this through the 17th SDG of partnerships to ensure participation and inclusion in achieving these goals.

There was universal concern among the participants that there needs to be a better alignment between the supply and demand features of the renewable energy market in India. On the supply side: while the current technological breakthroughs that have reduced the costs of solar energy, making it comparable with conventional thermal energy production, were regarded as a favourable precondition for growing the solar market in India, there were concerns that poor regulation and a demand for subsidies are potential obstacles. On the demand side: there were concerns about the top-down approach of energy provision in India. Such a policy has failed its villages as it was not conversant with the needs of rural India.

There was unanimous agreement that the way forward for provision of rural energy by Indian states was for smart city and smart village policies to be administered by local institutions to ensure ongoing participation of the user communities themselves. The appropriate agency for devising and running the smart city should be the municipal corporation, and the driving force for the initiative should be the mayors of every city. Similarly, the success of the smart village would be enabled by ensuring that the villagers can 'see' the benefits of renewable energy through a

demonstration of solar technology in their village.

The academics and the energy providers emphasised the need for such demonstrations of innovative technologies that could ‘disrupt’ the current production structure in villages, and show villagers how to install and maintain the renewable energy installations. This was regarded as necessary to ensure that renewable energy interventions in the village are profitable. It also permits local institutions to learn the principles of a sustainable village, and would be crucial in developing a new relationship between the governing and the governed.

The discussions in both workshops revealed that the biggest gains from an integrated sustainability solution for the smart city-smart village linkage would be to address the challenge of youth unemployment in both rural and informal

urban communities. The introduction of disruptive technologies that generate the opportunity for rural youth to learn new skills—installing and maintaining rural energy systems—has the potential to generate additional jobs for this age group. The scaling-up of solar energy-related youth skills might become an important driver to regenerate India’s demographic divide.

The promise of renewable energy, particularly solar energy, could also be the crucial policy variable for reducing poverty. Taking the case of horticulture, for example, it was agreed that renewable energy might allow a new pattern of land-usage: using solar energy for high-end drying and packaging activities, a diversification of rural income-generating activities could both increase rural income and increase the food production of the country.



INTRODUCTION

According to the 2011 census data, 69% of India's population, or around 833 million people, live in rural areas, against 31%, or 377.1 million people, in urban areas. It is projected that the latter figure will jump to 50% by 2050. The United Nations estimates that 840 million Indians will be living in urban India, while 700 million will continue to live in villages in 2050. There is therefore a definite need to convert these villages into smart villages to ensure the development of the entire country.

The smart village concept must consequently not only focus on the means and design for providing access to basic infrastructure such as roads, water, power, education, and healthcare facilities, but also on renewable energy access as a catalyst for sustainable growth and development of these villages. Communication and information technologies will play a major role in the design, delivery, and monitoring of these services. Above all, the key to success in creating smart villages lies in integrated planning which is well supported by robust monitoring and execution of the activities using appropriate governance models.

After the launch of the '100 Smart Cities Mission', the Government of India is now shifting its focus towards building smart villages, with its recently launched programme *Shyama Prasad Mukherji Rurban Mission (SPMRM)* aimed at making villages smart and the future growth centres of the nation. Currently, the Government is preparing its plan for 2,500 smart villages by 2019. To ensure a set of standards for the development of these villages, 14 components have been included in a list of parameters: skill development training linked to economic activities, agro-processing, storage and warehousing, digital literacy, sanitation, provision of piped water supply, solid and liquid waste management, village streets and drains, streetlights, fully equipped mobile health units, upgrading school infrastructure, village road connectivity, electronic delivery of

citizen-centric services, public transport, and LPG gas connections.

There is as yet no mention of the catalytic role of renewable energy as a means of enabling sustainable growth and development of these villages. This shortcoming can be addressed by working with the concept of smart villages developed by the Smart Villages Initiative (www.e4sv.org) which recognises the central value of renewable energy as a key component of sustainability. This addition is particularly relevant at the present time, as India is a signatory to the Sustainable Development Goals (SDGs) and the Paris Declaration. These commitments require not only specific, monitorable indicators but also an enabling policy framework and implementation capacity at the state level.

The state level workshops in India were organised in partnership with the Neeti Foundation, a think-tank based in New Delhi. The first of the two state level workshops was held in Odisha on 9 April 2016 with the support of the Kalinga Institute of Social Sciences (KISS), an institution that runs a fully residential school for 25,000 tribal children from the state of Odisha. The second workshop was held in Ranchi on the 3 August 2016 with support from the Government of Jharkhand.

The objective of these state level workshops was to learn lessons from the experiences of the states of Odisha and Jharkhand with regard to the use of renewable energy technologies and innovations, and the implementation of these technologies in different rural contexts. Our intention was to understand how these initiatives might help the villages and communities in each state to stimulate productive enterprises that contribute to building smart villages. A cross-section of stakeholders from across the renewable energy sector in the states of Odisha and Jharkhand participated in the interactive workshops, and there was a series of very insightful discussions that resulted in a

number of pertinent policy proposals. This report provides a synthesis of the discussions that took place in both the Bhubaneswar and Ranchi workshops.

This report also presents the key themes that emerged from these state level workshops in India, drawn from the presentations and discussions

that took place at the Bhubaneswar and Ranchi workshops. The programme and participants are provided in the annexes to this report, with Annex 1 providing the programmes and Annex 2 providing the list of participants. Each section of the report combines the proceedings from the Bhubaneswar and Ranchi workshops.



SETTING THE NATIONAL CONTEXT FOR THE STATE LEVEL WORKSHOPS

Dr. Suraj Kumar, Chief Mentor, Neeti Foundation

Suraj Kumar made introductory remarks at each of the state level workshops, setting out their intention within the context of the Central government's 'Smart City' initiative. He pointed out that this initiative was designed around creating a set of conditions that were necessary for selection as a smart city, rather than the automatic provision of funds to all cities. He also identified that the driving force for the initiative was the lead role accorded to the mayors of every city, and emphasised the importance of local institutions in contributing to the initiative. He referred to an acronym for S.M.A.R.T cities that could sum up the concept—Simple, Moral, Accountable, Responsive and Transparent.

There is an intellectual problem with the manner in which sustainability solutions are currently being set out. If the problem of sustainability or the role of a smart solution is to be addressed at the level of individual states, then problem solving should be undertaken within the state. If metropolitan solutions are being suggested as the way forward, as set out by the Smart Cities Mandate, then they need to be based on a local understanding of sustainability: they are far better understood within the state than at the national capital, New Delhi.

Drawing on his experience of preparing the Human Development Report (HDR) for the Municipal Corporation of Greater Mumbai, Suraj Kumar stressed that to achieve objectives such as those of sustainability for a smart city or a smart village we need to think organically. This implies that states need to come up with their own state plan, and this needs a continuous engagement on aspects such as conservation, analytical work on secondary data, and long-term involvement of

experts. Local participation is particularly relevant in the case of current global concerns: while the Millennium Development Goals (MDGs) did not explicitly call for participation, the Sustainable Development Goals (SDGs) have a key requirement for the goals to be achieved through participation and engagement at the local level.

Suraj Kumar then moved on to talk about the implications of the recent discussion of renewable energy evident in the national agenda. Various renewable energy projects that have recently come up across different parts of India illustrate the fact that renewable energy is now accessible in a development context due to a change in relative energy prices. However, it is very easy to be carried away by a new fashion, and if there is a real intention to change India's energy policy then there is a need for a renewable energy agenda to ensure integration of renewable energy in both India's smart cities and smart villages. This integration will require collaboration between a number of sectors; in particular the private sector needs to align with the government in contributing to bridging the funding gap to make this model a success.

Suraj Kumar ended his remarks at both meetings by reminding the audience of the need to recognise the important role that politics play in the development process. Political will is central to ensuring development and a function of three things: relevance, salience, and intensity of public opinion. In identifying appropriate forms of rural development, the new states such as Jharkhand and poorer states such as Odisha have a greater keenness to identify targets for sustainability. The setting of these targets should be undertaken in close conjunction with experts on these specialist subjects, and adequate resources need to be allocated to achieve the desired result of inclusive development.

Dr. Shailaja Fennell, Smart Villages Initiative, University of Cambridge

Shailaja Fennell made the link between the national level discussions and the state level opportunities for sustainable development by explicitly bringing in the catalytic role that renewable energy could play to enable sustainable development. She pointed out that the targets for the Sustainable Development Goals adopted in 2015 need to be achieved by 2030. This global initiative follows on the heels of the MDGs, where as a signatory India put great effort and funds into the achievement of goals of no hunger, health for all and education for all, through national flagship programmes such as the Sarva Shiksha Abhiyan and the National Health Mission. However, there is still a long way to go to achieve these goals, among others. There are also huge disparities with regard to other services, and a particularly stark disparity in the availability of energy between urban and rural India.

As official Indian statistics indicate that, despite recent efforts, only 60-70% of India's population has access to electricity, there is a huge potential that can be harnessed by bringing in solar and wind technologies to deal with the unmet domestic demand for electricity. Despite being a fledgling industry in India, the solar and wind energy sector has already created around 70,000 jobs within the last three years in India. While the states of Odisha and Jharkhand have the option of using the growth opportunities that can be harnessed from conventional energy sources (such as mining coal) this would increase the vulnerability of these states to climate change. The case for the use of low-cost power generation based on the plentiful availability of conventional energy sources in the states of Odisha must be balanced against the huge human cost imposed

by increasing vulnerability to climate changes. The increasing need to ensure that state infrastructure is robust enough to combat climate change puts investment in alternatives, such as renewable energy, at the forefront of policy discussions.

Shailaja Fennell stressed the importance of better understanding of the sustainability needs of the state in relation to the demands placed by the sustainability goals. The case of the states of Odisha and Jharkhand, which have been at the forefront of looking for new solutions for sustainable development, is inspiring. There are already ongoing initiatives to advance policy thinking on sustainability, and these workshops provide a valuable opportunity for policy makers to meet and discuss how smart city-smart village linkages within each of these states can become the core of such sustainability initiatives.

State level initiatives are best placed to ensure the participation of local communities. The ability to keep sustainability goals relevant to communities requires the engagement of local government and non-governmental organisations. Regular interactions between these stakeholders are necessary to identify goals that emerge from gaining a fuller understanding of the basic needs of people in local communities. A particularly pressing need is the challenge of youth unemployment in both rural and informal urban communities. The current trend towards increased urbanisation has not increased the opportunities for youth employment. There are large gaps in relation to access to quality education and skill acquisition that are preventing youth from gaining employment. In order to harness the potential of local youth there is a need to enable skill development at the local level. Renewable energy seems to have a great potential in that regard.

NATIONAL LEVEL CONTRIBUTIONS

Ranchi Workshop

Rakesh Kumar, Ministry of Environment,
Forest and Climate Change

Rakesh Kumar began his remarks by examining the current population scenarios in both rural and urban areas, with 35% of the population living in urban areas and 65% in rural areas. This situation will reverse by 2050. In this context, he focused on the need to understand the interconnectedness of the concepts of the 'smart city' and the 'smart village' in current thinking on models for development. On the one hand, the smart city model is focused on smart transportation, smart parking areas, and better institutions for urban areas, while the smart village model, on the other hand, has focused on a set of associated programmes, such as service delivery and better use of resources in rural areas. There is not enough focus on other important programmes; for example, the need to develop alternative forms of energy such as biomass energy solutions.

Rakesh Kumar put forward the view that to achieve the goal of sustainable development successfully, it would be pertinent to accord primary importance to the design of environmental rules that permit a fuller focus on inclusive and participatory development. He suggested that the objective of improving the rural service delivery system would be strengthened if village institutions could be linked to the programmes set up by the state government. The key offices of the district collector and revenue officer are crucial nodes for ensuring such linking of village institutions to state level institutions. There should be a parallel creation of smart villages alongside smart cities, as neither concept is likely to succeed without the other. In fact, the co-existence of both of these concepts within a single model is necessary for a sustainable development solution for the large population that currently exists in both rural and urban India.

Rajat Kathuria, Director and Chief
Executive, Indian Council for Research
on International Economic Relations
(ICRIER), New Delhi

Rajat Kathuria took up the discussion by underlining why there is an urgent need to look closely at urbanisation and smart cities. He pointed out the recent research finding by the Indian Council for Research on International Economic Relations (ICRIER) that the structural transformation in India has led to jobless growth, since the service sector could not create an adequate number of jobs and the manufacturing sector has not grown as fast as had been previously predicted.

He compared this situation with that of China, where registration of rural and urban residents through the Chinese *hukou* registration system, as well as the one-child policy, have operated as considerable brakes on the migration of population. The lack of similar policies in India means that India's potential of a demographic dividend, i.e. a growing national domestic product being contributed by the largest ever share of young adult population (18-35 years), might not ever be realised. Instead, there may be a nightmare scenario where there is growing unemployment among this demographic group of youthful adults. The growth in the demographic profile of young adults does not automatically result in additional jobs being generated for this age group. In fact, a number of economic conditions need to be fulfilled for the youth population to be able to get employment, and therefore be able to generate a demographic dividend.

Underlining the challenge that faces India today, Rajat Kathuria made the observation that with a 33% urbanisation that is projected to reach 50% by 2050, some 600 million people are going to be living in cities. This will be taking place at a juncture where 75% of India's GDP will be generated by cities, and where 90% of Indian taxes

will come from cities. It is only at this late stage in India's development that there has been an explicit treatment of the need to recognise the role of urbanisation in mainstream policies and development goals through programmes such as the Smart Cities initiative.

A recent study by ICRIER examining the nature of India's urbanisation in the post-reform period, 1991 to 2013, and using data from NASA (the US National Aeronautics and Space Administration), has shown that Indian urbanisation has occurred in clusters. Analysing the intensity of the night-light data and dividing the data into 666 districts, the study showed that rapid growth of urbanisation is taking place in certain districts such as Bangalore, Gurgaon, Delhi, and Kolkata. It also revealed that laggard states or districts are not growing as fast as the better-off states.

India's urbanisation has a lower level of service provision than that provided in cities in other countries with a similar profile of urbanisation. There is a particular difficulty in the case of the emergence of newer cities, such as Indore and

Surat, which faced challenges in meeting the cost of delivery of basic services like water, sanitation, electricity, and transportation.

Rajat Kathuria suggested that there needs to be a greater readiness in the Indian political environment to allow policy interventions to be undertaken at the level of local administration. It should be the responsibility of the municipal corporation to design policies in an efficient and cost-effective manner, and there should be laws that empower the municipal corporation to provide new channels of finance. There is clearly a need to increase energy supplies in India, and unless there is a breakthrough in the cost of batteries it is not likely that there will be a shift from coal-based energy to alternative sources of energy, such as renewable sources. The challenge of renewable energy applies to both urban and rural India. In rural India, the creation of sustainable service delivery systems would also need to be based on local solutions, both in infrastructure and in the energy sector, and the latter would need to be grid ready, rather than stand-alone systems.



PERSPECTIVES ON SMART CITIES AND SMART VILLAGES

The following perspectives on smart cities and smart villages draw on of the presentations and discussions that took place at the Bhubaneswar and Ranchi workshops.

Views from the Bhubaneswar workshop

Dr. Achyuta Samanta, Founder of Kalinga Institute of Information Technology and Kalinga Institute of Social Sciences

Achyuta Samanta highlighted the current global energy crisis for poor countries, and how the effective utilisation of renewable energy could provide a very pertinent solution to the problem faced by poor urban as well as rural communities and households¹. It is important for all institutions to play their part in bringing in renewable energy policies. Achyuta Samanta is keen that the Kalinga Institute of Information Technology (KIIT) and Kalinga Institute of Social Sciences (KISS) should adopt a renewable energy policy: this will be the objective of these institutions in the coming years. As the educational campus of KISS is already equipped with solar energy, rainwater harvesting systems, water recycling and recharge mechanisms, the greening of the campus through the use of renewable energy, particularly the use of solar home systems, would be the logical next step in order to convert the entire environs into a green campus.

Achyuta Samanta is also keen to take up the concept of smart villages, where renewable energy can be a catalyst for rural development as proposed by the Smart Villages Initiative. This initiative will be applied to his native village, Kalarabanka, which he converted into a model

village in 2005. The village now has all the amenities available in the city: a primary school and a high school, a post office and bank, a hospital and police station, internet access and all-weather road connectivity. The creation of these facilities in Kalarabanka has been a catalyst of improved facilities in the cluster of neighbouring villages in the area of Manapur Panchayat, which is also on its way to becoming a Smart Panchayat.

Achyuta Samanta concluded his presentation by recommending that policy makers encourage more villages in India to adopt the smart village concept. The success of such a new policy direction requires the establishment of a strong partnership between the government and other local stakeholders to ensure that villages use renewable energy as a catalyst, to build smart and sustainable communities.

Vineel Krishna, Managing Director, Odisha Mining Corporation, (OMC) and Chief Executive Officer (CEO), Smart City Ltd.

Vineel Krishna spoke of the changes that are taking place in the city of Bhubaneswar, as it attempts to become one of India's smart cities. He expressed his excitement about Bhubaneswar topping the list of 20 smart cities put out by the Ministry of Urban Development and congratulated the audience, as citizens of the city, for their active participation in the Bhubaneswar Smart City proposal-making process.

In his capacity as CEO of Smart City Limited, he discussed the guidelines that had been laid out for the development of a smart city, and pointed out that the biggest thrust necessary to meet these guidelines is to ensure that there is an integrative approach to development. There is a need for better use of technology to integrate the facilities, services and operations of various government initiatives to develop cities smartly and efficiently.

¹ Dr. Samanta was unable to attend the Ranchi meeting due to a personal bereavement, and his speech was read out by a faculty member of the KIIT-KISS institutions.

Cities should be developed in accordance with environment-friendly principles. The key areas of sustainability are the adoption of renewable energy, the promotion of green spaces, better use of public transport, putting in waste water recycling mechanisms, and the improvement of waste management systems.

Vineel Krishna noted that while he had been given guidelines for developing Bhubaneswar as a smart city, he had not come across the idea of smart villages within this paradigm. Consequently, he had not accorded much thought to the relationship between the smart city and smart village concepts. He was pleased to learn about the concept of the smart village promoted by the Smart Villages Initiative, and is enthusiastic about the manner in which he could incorporate the notion of a smart village, both in his role of CEO of the Smart City Limited, as well as in his capacity of Managing Director of Odisha Mining Corporation, a major player in the larger energy and sustainability space in Odisha.

**Dr. Krishan Kumar, Vice-Chairman,
Bhubaneswar Development Authority and
Commissioner, Bhubaneswar Municipal
Corporation**

Krishan Kumar began his presentation by giving an overview of how the Bhubaneswar administration went about working on the 'Smart City' proposal in the run-up to the national competition for obtaining Smart City status. The distinctive feature in Bhubaneswar's bid was the high level of civic engagement in the bid documentation. The credit for the excellent citizen feedback went to the group of KIIT-KISS educational institutions, as they had formed a partnership with the municipal authorities by which students of the institutions canvassed opinions of their families and friends. It was this kind of local interaction that was key to creating a workable Smart City policy in the city of Bhubaneswar.

The competition was a useful mechanism for learning how to create a new policy. Furthermore, there was considerable learning available to Bhubaneswar, and the state of Odisha, a late urbaniser, from the mistakes made by other cities that had seen a boost in urbanisation in previous decades. These lessons will be invaluable in helping Odisha create well-planned policies for smart cities and smart villages.

Krishan Kumar cited examples of such lessons from the common misconceptions around air and pollution, where there is a primary focus on the pollution from industries, but not enough attention is paid to the less visible pollution from vehicles—itsself due to inadequate provision of public transport. In the case of water pollution, there needs to be a broadening of scope from polluting industries to looking at poor sanitation and waste management in the urban informal sector and the rural sector. A larger canvas is needed, where there is the possibility of focusing on better mobility infrastructure, like footpaths and cycle tracks, and on innovative technologies such as the use of electric cars that will help build sustainable and smart cities and villages.

In the particular case of the role of renewable energy, there is considerable potential for a far greater contribution of solar energy to overall energy generation in India. The future of solar energy in India requires new thinking on the value of disruptive technology and innovation across sectors and fields. It is these types of innovations that have reduced the cost of solar energy generation so that renewable energy is now able to match the cost of production of conventional energy. The recent technological advances in the solar energy space, and the associated cost parity, are crucial if renewable energy is to become the game-changer for India and hasten the move towards more sustainable energy-driven cities and villages.

Krishan Kumar concluded by stating that, in his view, it is very clear that the future belongs to disruptive technologies and innovations which will become the enablers of smart cities and smart villages on various fronts, particularly in relation to energy, transport, healthcare delivery, and governance. The new concept of the 'Internet of Things' is currently driving research, wherein sensor-based technology will take the lead in the development of both urban and rural areas, and it should also be a core feature in new policy thinking. This could be the forerunner of a future where the internet will not only be used by people but will also be used by things like water taps, meters, lighting and just about everything, including efficient monitoring systems. This will open up a huge window for smart villages, because people will not have to move to cities in search of improved living standards.

Views from the Ranchi Workshop

Dr. Santosh Kujur, previously with the Government of Jharkhand and now Team Leader and Consultant to the Auditor General of Afghanistan

Santosh Kujur began his presentation with a brief overview of Jharkhand's resource abundance. He pointed out that while Jharkhand has 30% of the coal deposits of India, a large part of this resource is currently used to meet the energy needs of other states. The energy benefits being enjoyed by other states need to be evaluated in relation to negative implications for the ability to meet the needs of future generations in the state of Jharkhand. In general, there is a limited understanding of the trade-offs and correlations between a particular development policy and the type of energy (power) policy.

There has not been an attempt at developing an explicit correlation between nuances of development and energy policies, and there has been little discussion about alternative energy policies that might change the pattern of state

development policies. There is an acute need to look at energy alternatives to sustain the growing energy demands or there will be a stalling of the state's development process.

Santosh Kujur made the case that there is an urgent need to focus on solar power as an alternative energy source, and he emphasised the role of solar home systems (SHS)—known in the state as rooftop solar plants—in changing energy policy. Rooftop solar plants involve three entities operating at three different points in the energy production process: i.e., at the stages of generation, transmission and distribution. Since these processes are often run by different firms or other government entities, it becomes difficult to sustain a SHS system without a full understanding of how energy production by households can be sustainably linked to other players in the solar energy sector.

Lastly, Santosh Kujur discussed the issue of transmission loss by pointing out that this can be solved only through up-scaling the projects, such as through a micro-grid or other technical solution. These losses have currently made it very difficult for policymakers to set rural tariffs, and there is a need for a better pricing policy, such as the model of cross-subsidy where some part of the tariff might be passed on to the industrial and urban consumers.

Narrotam Moyal, Accountant General's Office, Ranchi

Narrotam Moyal began his presentation by making the point that the idea of "smart" is helpful as it enables one to think of how to create better-performing systems. Jharkhand is endowed with natural resources and adequate financial resources, and so better performance is particularly relevant. The challenge for Jharkhand in making development policy is the difficulty of finding the correct level of government to ensure successful implementation of development policies. There is a weak structure of local government in many

of the districts of the new state of Jharkhand, and this prevents the development process from reaching its desired goal.

State level programmes for improving human development and advancing sustainability solutions are stymied by a lack of capacity to implement policies effectively. Using examples from the fields of forest management and rural development, Narrotam Moyal made the point that the audit trails on implementation of forest conservation and restoration of rural infrastructure programmes indicate that the targeting of beneficiaries has been rather poor. The focus needs to be on improving accountability through a more robust data collection system. A more participatory system that incorporates local needs in development projects could be achieved by building a well-designed public information system about new programmes. There would be the added benefit that this would give a greater sense

of ownership in such processes to members of the local community.

This is particularly pertinent in the case of natural resource management, where it is difficult to discuss how poor communities can manage their energy needs using local materials. In these contexts, there is a particular need to help poor communities access energy by focusing on alternatives such as solar energy. Such initiatives are more likely to be successful if they are undertaken as multi-sectoral partnerships, where there is the possibility of creating a financial package that reduces the unit cost of solar home systems for the individual rural household. Such partnerships could develop collective schemes where rural households could participate as a group, and through systems such as a mini-grid the rural community would be able to create a scaled-up model that would be financially viable.



ACADEMIC APPROACHES TO SMART CITIES AND SMART VILLAGES

From the Bhubaneswar workshop

Prof. Saroj Nayak, Founder, KARMA Pvt. Ltd. and Professor at IIT Bhubaneswar

Saroj Nayak started his presentation by sharing a real-life situation which he had experienced in the 1990s, when power cuts disturbed his work in his initial days at IIT Bhubaneswar after returning from a decade doing research in the United States. He explained that it was dealing with these adversities that led him towards innovating and creating a solar UPS (uninterruptible power source), which then went on to become the beginning of an innovative technology unit that he set up with his team at IIT Bhubaneswar. This example illustrates the need for disruptive technology in the renewable energy sector in India. Further innovations that can maximise the potential of available solar energy and other renewable resources are important.

Saroj Nayak went on to speak about the commercialisation of the IIT Bhubaneswar solution, whereby he developed a company that worked on a robust pricing model for their solar UPS so that it could be deployed in villages in Odisha. This would give them access to energy sources, without needing to access formal power markets, for a very nominal investment. Local NGOs as well as national rural development organisations such as the National Bank for Agriculture and Rural Development (NABARD) played a key role in assisting his company to reach out to village communities. The key to the success of installing his solar UPS system was building the ability of the local NGO to demonstrate the benefits of the new device, and working with NABARD to provide the finances for one-time nominal investments to access the benefits of the UPS—the solar-powered fan, lights, and mobile charger SHS unit developed by IIT Bhubaneswar.

A further benefit of the installation of the solar UPS through the educational auspices of local NGOs is that the IIT Bhubaneswar team were able to train local youth. They have now become small entrepreneurs who continue to provide maintenance services to the rural communities to ensure the continued functionality of the kits. While the IIT Bhubaneswar innovation is still in its early days, there is a huge potential for innovation in the renewable energy space, and these disruptive innovations will be central pillars in making India's cities and villages sustainable and smart in the future.

Professor Satyajit Singh, Professor in Political Science, University of Delhi

Satyajit Singh began his presentation by speaking about the need to devise a holistic development policy for Jharkhand through the lens of smart cities and smart villages. There is a particularly pressing need for such an alternative model to be devised as there has been a history of development thinking that has revolved around emphasising the dichotomy of modern versus traditional. This dichotomy is linked to the manner in which the Indian Constitution was drafted, with a sharp dichotomy between the position of Dr. B. R. Ambedkar and that of Mohandas Karamchand Gandhi on the role that should be played by village society and Panchayati Raj institutions in India's development plans.

This dichotomy also existed in the manner in which the European idea of modernity was first constructed, where there was a reconstruction of villages to make them fit in with modern notions of aesthetics, while there was a new form of residence in the townships that were constructed for industrial workers and for miners throughout Europe. There have been subsequent changes in these notions over the last century, the cases of Soviet industrialisation, the Chinese household

registration system and South African apartheid being extreme instances where the village and township divisions were institutionalised methods used by the state to control and segregate different groups, such as the rich and poor, and whites and blacks.

For a new holistic development model there needs to be a process by which policy making takes place in two stages. The first stage needs to be concerned with decision-making regarding where people live, and the second stage where decisions are made by people about the kind of livelihoods that they plan to undertake. To make such alternative holistic models possible, it is necessary to work with existing institutions so that they can learn about the importance of bottom-up decision-making. This is crucial for the success of this new thinking about development policy, as existing institutions do not adequately understand how power relations operate in local communities. Consequently, state institutions often act as if they have the automatic right to resolve any development problem.

Satyajit Singh suggested that the successful resolution of problems requires government to allow local institutions to explore alternative solutions to that of top-down development. There are three pillars that would result in a sustainable village: institution of self-governance, economic well-being, and social welfare. The way forward to ensure the development of these three pillars would be by developing a new relationship between the governing and the governed. This would involve the design and implementation of a process by which partnerships can be initiated between the local administration and the local people to ensure accountability through social audit and other public forms of assessment. It is the functioning of these partnerships within the state that would form a basis for creating smart institutions that are better able to deliver outcomes, by ensuring that ownership of the design of renewable energy and other sustainable solutions is located in rural communities.

Professor Krishnan Narayanan, Head of the Department of Humanities and Social Sciences, Indian Institute of Technology, Bombay

Professor Narayanan began his presentation by comparing the contexts within which the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs) were developed. While the MDGs did not focus on infrastructure, the SDGs have a strong focus on sustainable energy and improving access to infrastructure. This is a very important addition given the very poor and under-developed state of Indian infrastructure, where close to 70% of the population lack clean and affordable energy for cooking. In this scenario, it is important to increase the availability of infrastructural services for this underserved majority of the population before beginning any discussions on conservation within these disadvantaged communities.

Energy plays an important catalytic role in fulfilling the needs of an individual in the fields of education and job creation in the agricultural sector. Renewable energy has the potential to guarantee inclusive development, a key feature that is necessary for ensuring sustainable solutions. The current government is making efforts to fill the existing infrastructural gaps in rural areas through new programmes such as the Shyamaprasad Mukherji Rural Mission and the Deendayal Upadhyay Gram Vriddhi Yojna.

Discussing the way forward for Jharkhand, Prof. Narayanan made the point that renewable energy could be the crucial policy variable that achieves a reduction of poverty. Taking the case of horticulture, Jharkhand could change the land-usage pattern as currently only 10,000 hectares, or 4.5%, of land is under different horticultural crops, with a further 80,000 hectares of land used for food-producing plants. There could be a further extension of horticultural and food crops in the regions of Chota Nagpur and Santhal Paraganas, which could result in increased revenue from the

export of fruits, vegetables and ornamental crops. These agricultural activities could all benefit from a shift to using solar energy as a source of power for agricultural activities.

Prof. Narayanan also stressed the relevance of community participation and stakeholder con-

sultations, such as those developed by the local people supported by an institution in Pune, Yashwantrao Chavan Academy of Development Administration (YASHADA), which trains civil servants to facilitate participation within local communities.



BUSINESS APPROACHES TO SMART CITIES AND SMART VILLAGES

From the Bhubaneswar workshop

Dr. Chidambaram Palaniappan, Managing Director, Sun Best Solar Product

Dr. Palaniappan started his presentation by looking at the demand-supply gap in global energy needs and the role of renewable energy in filling that gap. In India there is a particular demand-side gap in the adoption of renewable energy between urban and rural areas, with renewable energy becoming acceptable in urban areas but with very limited uptake in rural areas.

There have been many success stories in value addition and job creation using mini-grids in the solar energy sector. Despite these successes there is a need to move from solar electricity generation to solar-thermal energy production, as the latter is far more important for the creation of 'Solar Villages'. The reason that solar-thermal energy is central to this new initiative is that it can be very effective for bringing in food processing technologies and reducing post-harvest losses.

Dr. Palaniappan showcased several case studies of the successful use of solar-thermal energy in food processing industries like tea, spices, fruit and vegetable drying, and fish drying, which have created new employment opportunities in villages in the state of Tamil Nadu through the expansion of the renewable energy sector. He concluded that the advancement of these various forms of solar technology is crucial, and best supported when all local stakeholders come together to support the technical and financial requirements that are necessary for rural households to access these technologies.

Sanjeeb Kumar Tripathy, Managing Director, GEDCOL

Mr. Tripathy gave a brief overview of Green Energy Development Corporation of Odisha (GED-

COL), created by the Government of Odisha in 2013 to give an impetus to the development of renewable energy. He provided details of Odisha's power generation pattern across thermal, hydro, and renewable sources, and pointed out that these various initiatives have resulted in Odisha becoming an energy-surplus state. As the nodal agency for solar power in Odisha to conduct and facilitate feasibility studies of projects and render necessary assistance for the developers, GEDCOL has played a key role in creating this favourable state of affairs.

The thrust to develop green energy solutions is crucial for the creation of smart cities and smart villages. GEDCOL, as a developer of new technologies, is in a good position to identify regulatory and project implementation hurdles faced by companies working in the renewable energy sector. GEDCOL had sought assistance from the World Bank in formulating a Renewable Energy Policy that includes provisions for on-grid solar power as well as off-grid solar power. This policy has also focused on the provision of regulatory incentives by waivers to testing and supervision charges, and to VAT and entry taxes, but it has not awarded any direct financial benefits. This is considered appropriate as the thrust of the policy is also to facilitate development in rural areas by encouraging the use of solar PV pumps for micro-irrigation, drinking water supply, and sewerage treatment plants, rather than encouraging a subsidy culture.

GEDCOL is going ahead with solar PV-powered hoardings, signage, and mobile towers to reduce the burden on the conventional sources of energy in urban and rural areas. Furthermore, GEDCOL is actively promoting a green energy culture in villages that do not have access to conventional power lines by distributing solar lanterns, solar home lighting and street lighting equipment. There is also a programme for advising rural communities on the benefits and costs of solar water heating systems and solar steam systems.

Mr. Tripathy concluded that the government is taking cognizance of the role of renewable energy in creating smart cities and villages. In line with this role, they are making the requisite policy interventions and facilitating help to all the companies in the energy sector.

Shruti Kanta Mishra, Founder, Maiestas Luminaries Pvt. Ltd.

Mr. Mishra started his presentation by highlighting the challenge of solar energy storage, which is not only a tedious process but also turns out to be an expensive proposition. There is also an acute need for efficient lighting systems, as these are an important component in the everyday lives of ordinary citizens. He went on to explain the various technological innovations undertaken by his company in the field of optics by which the output of the LED lights is enhanced without impacting the cost of the products. The company's innovations have taken into account the environment-friendliness of the products, as most of its lighting components use recycled polymer waste.

While showcasing some examples of the installations and work done by his company, Mr. Mishra explained how innovation in product technology, combined with inclusion of green concepts in manufacturing, has enabled them to move out of the incubation cell of the KIIT campus into their own new state-of-the-art manufacturing facility in Odisha. He mentioned the various offerings at the new manufacturing facility and how it has opened up employment opportunities in the five neighbouring villages. The hiring of local talent has provided youth an important opportunity to access information and technology.

As the technology took off in the area the villagers were quick to adopt and accept these innovations as part of their lives, and this was followed by a change in their behaviour and attitude. The villagers are increasingly keen to maintain their appliances once they have experienced an improvement in their livelihoods on account of the

adoption of the new renewable energy technologies. Mr. Mishra felt that this was a crucial turning point for ensuring the sustainability of village technologies, and necessary to ensure that villages became smart villages.

Shirin Kujur, Senior Manager-CSR, Renew Power Venture Pvt. Ltd.

Shirin Kujur began with a brief introduction to the Renew Power venture, a leading private sector player in the renewable energy production space in India. With its focus on renewable energy, Renew Power is committed to playing a leading role in India's current energy portfolio by delivering cleaner and smarter energy choices for consumers, and also by reducing the carbon footprint, keeping in mind the reality of climate change.

The current state of human and economic development in Jharkhand is far below the average for India, with regard to indices for development. This is a particularly important reason to push for a sustainable model of development in the state.

The current national government has recently decided to develop smart villages so that there can be sustained improvements in rural health, education, and livelihoods. However, projects are not likely to succeed without an effective collective partnership of all the stakeholders. If there is to be an effective sustainable development strategy in India, then this partnership should include all stakeholders: the government, private investors, and civil society members. This extended partnership would be crucial to setting out processes to achieve SDGs 1 to 16.

Shirin Kujur concluded that an effective way forward for Indian policy-making on sustainability would be to categorise the Sustainable Development Goals under the three pillars of human capital, social capital and natural capital, with the most important being the 17th SDG of partnerships to ensure participation and inclusion in achieving these goals.

NGO PERSPECTIVES ON SMART CITIES AND SMART VILLAGES

Manish Kumar, The Energy and Resources Institute (TERI)

Manish Kumar began by focusing on renewable energy and sustainable development in villages with a presentation of TERI's 'Lighting A Billion Lives' campaign, launched in 2008 with the objective to provide electricity access to rural households that were not linked to the national grid. This programme has achieved some success in bringing solar energy to rural households.

The current government has also begun to focus on solar energy through its "Solar Mission" that aims to address the energy gap which exists in rural parts of the country. There are some challenges to the successful implementation of this programme, due to the lack of finance for providing electricity to poor rural communities. Furthermore, there is often an unwillingness among agencies to work in remote areas where there is a low population density. A workable solution would be to develop small and micro enterprise campaigns to set up productive enterprises powered by solar energy. This innovation would ensure that there is a higher profitability associated with solar energy use, as opposed to the primary purpose of consumption in households. It would make investment in rural households more attractive for commercial providers of solar energy.

This model has been the cornerstone of success in TERI's 'Lighting a Billion Lives' campaign, as incorporating an entrepreneurship model made financing easier and also developed a pool of entrepreneurs running small and micro enterprises across the country. These enterprises become visible symbols of success and can actively promote the benefits of renewable energy in India.

Mr. Kumar emphasised that these successes have been the result of active collaboration between the government, corporations, state level agencies

and entrepreneurs. He concluded that TERI's approach to addressing the financing of solar home systems and subsidising the services to beneficiaries by creating a local level entrepreneurship model has been its unique selling point. This integrated domestic energy system, based on cost sharing and entrepreneur training, was only made possible due to continued government support for the solar energy sector.

Ganesh Reddy, Secretary and CEO, Citizens Foundation

Ganesh Reddy began his presentation by focusing on the key role of community participation and the impact of collective action initiatives in designing a sustainable future for India. He was of the opinion that the 17th Sustainable Development Goal of partnerships is the crucial link that could ensure that there are bottom-up solutions for sustainable development. These partnerships require that the participation of local citizens is the starting point for any decision-making process.

Ownership by community members is key to their ability to set out their needs and to voice their concerns. The importance of local ownership is that it translates directly into the people's mandate relating to the nature of development solutions. Grassroots-based decision making, accompanied by the involvement of other stakeholders in the energy sector, is a prerequisite for ensuring the sustainability of the renewable energy sector. Thus stakeholder involvement is the prerequisite for achieving sustainability.

In the absence of local participation it is difficult to get infrastructure projects off the ground as they are unable to meet the needs of local people. It is for this reason that all renewable energy projects should be designed and implemented only after adequate local consultation, and followed by clear accountability and evaluative measures.

DISCUSSION AND WRAP UP

The format of both state level workshops was for the presentations to be followed by a general discussion on the issues raised, with participation from the audience. The matter of partnerships as a fundamental requirement to promote alternative technologies for rural development was raised a number of times by members of the audience. There was a particular emphasis on the importance of developing cross-sector partnerships that was repeatedly highlighted by stakeholders from the government, private, and civil society sectors.

There was also some concern that technology would not be a sufficiently dynamic catalyst without due regard being given to the financial viability of buying these technologies in very poor rural communities. There was a general agreement that for renewable energy to enable the creation of smart villages there should be a bottom-up approach, where the needs of the rural poor as well as their financial abilities, are taken into account.

There was also an emphasis on the need to link the smart city initiative, with its emphasis on

technologies such as a sensor for data collection, to new knowledge platforms that can make these ideas accessible to rural youth. It was felt that it would be helpful to have some model villages where those local communities who wanted to embark on renewable energy initiatives could visit and see the benefits for themselves.

There was a keenness among members of the audience to work with the Smart Villages Initiative to identify the key characteristics of smart villages. A number of participants requested that further information be provided on how the smart villages concept could be linked to the current Smart Cities initiative being implemented by the Government of India.

Suraj Kumar and Shailaja Fennell provided concluding remarks at each of the meetings. They thanked the speakers for their valuable insights, and appreciated the opportunity accorded by the workshops to learn from each other's experiences and to share best practices that would further the possibility of making smart villages a reality in India.

ANNEX 1: STATE WORKSHOP AGENDAS

First stakeholder workshop on renewable energy

Kalinga Institute of Information Technology/Kalinga Institute of Social Sciences,
Bhubaneswar, Odisha

9 April 2016

Agenda

9th April 2016

9.30 am – 10:00 am Registration and coffee / tea

10:00 am – 10:45 am **Welcome Address by:** Dr. Achyuta Samanta, Founder of KIIT & KISS

Introductory Remarks: Suraj Kumar, Chief Mentor, Neeti Foundation

10.45-12.30 pm **Address by:** Dr. Vineel Krishna, CEO, Smart City team Bhubaneswar

Address by: Dr. Krishna Kumar, Vice-Chairman, BDA and Commissioner, BMC, Bhubaneswar on Smart City Initiative

Address by: Dr. Shailaja Fennell, University of Cambridge and Smart Villages Initiative

12:30—2:00 pm **Odisha- Opportunities in green energy: Presentations by green energy providers**

Prof. Saroj Nayak, Founder, KARMA Pvt. Limited, Head of School, School of Basic Sciences, IIT Bhubaneswar

Dr. C. Palaniappan, Managing Director, Sun Best Solar Product, Theni, Tamil Nadu

S. K. Tripathy, Managing Director, Green Energy Development Corporation of Odisha (GEDCOL)

Shruti Kanta Mishra, Founder, Maiestas Luminaries Pvt. Ltd, Bhubaneswar

Lunch

Second stakeholder workshop on renewable energy
Utsav, Hotel Chanakya BNR, Ranchi, Jharkhand
3 August 2016

9.00 am – 10:00 am Registration and Coffee/ Tea

Inaugural session

10:00 am – 11:00 am **Introductory Remarks:** Dr. Suraj Kumar, Chief Mentor, Neeti Foundation and Co-Founder, Kronstadt Indus

Special Guest Address: Dr. Kadey Soren (on behalf of Achyut Samanta, Founder, KIIT University)

11:00 am – 11:30 pm Tea Break

11.30 pm – 1: 00 pm **Session I - Sustainable Development Goals and engines of local development**

Panelists/ Experts:

- Professor. K. Narayanan, IIT Mumbai
- Professor Satyajit Singh, Delhi University
- Rajat Kathuria, Director, ICRIER
- Dr. Shailaja Fennell, University of Cambridge and Smart Villages Initiative
- Manoj Kumar Pandey, Light a Billion Lives, TERI

Interactive Q & A

1:00 pm – 2:00 pm Lunch

2:00 pm – 3:30 pm **Session II – Renewable energy and sustainable development**

Panelists/ Experts:

- Santosh Kujur, Jharkhand State Electricity Regulatory Commission
- Rakesh Kumar, Director, Ministry of Environment, Forest and Climate Change, Government of India.
- N. Moyal, Deputy Accountant General, Ranchi
- Shirin Kujur, ReNew Power
- Ganesh Reddy, CEO, Citizens Foundation, Ranchi

Interactive Q & A

Tea Break 3:30 pm – 4:00 pm

4:00 pm – 5:00 pm Wrap-up Session and the Way Forward

ANNEX 2: LIST OF PARTICIPANTS

Bhubaneswar workshop

<u>Name</u>	<u>Organisation</u>
Dr. Achutya Samanta	Founder of Kalinga Institute of Industrial Technology (KIIT) and Kalinga Institute of Social Sciences, Bhubaneswar
Dr. Suraj Kumar	Chief Mentor, Neeti Foundation, New Delhi
Dr. Shailaja Fennell	Smart Villages, University of Cambridge
Dr. Vineel Krishna	CEO, Smart City team and MD, Odisha Mining Company, Bhubaneswar
Dr. Krishna Kumar	Vice-Chairman, Bhubaneswar Development Agency (BDA) and Commissioner, Bhubaneswar Municipal Corporation (BMC)
Prof. Saroj Nayak	Founder, KARMA Pvt. Limited and Professor and Head of School, School of Basic Sciences, IIT Bhubaneswar
Dr. C. Palaniappan	Managing Director, Sun Best Solar Product, Theni, Tamil Nadu
S. K. Tripathy	Managing Director, Green Energy Development Corporation of Odisha (GEDCOL)
Shruti Kanta Mishra	Founder, Maiestas Luminaries Pvt. Ltd, Bhubaneswar
Ashok Kumar Singha	Managing Director, CTRAN Consulting, Bhubaneswar
Dwiti Vikramaditya	Advisor, KIIT and KISS group of institutions, Bhubaneswar
Tushar Senapati	Deputy Director, Project and Research, KIIT and KISS group of institutions, Bhubaneswar
Suraj Roy	Deputy Director, Research Mobilisation, KIIT and KISS group, Bhubaneswar
Professor Srijit Mishra	Director, Nabakrushna Chowdhury Centre for Development Studies, Bhubaneswar
Dr. Somvaya Basu	L V Prasad Eye Institute, Bhubaneswar
Professor L. K. Vaswani	Professor of Rural Development, KIIT University, Bhubaneswar
Suryaprabha Sadasivan	Researcher, Neeti Foundation, New Delhi

Ranchi workshop

<u>Name</u>	<u>Organisation</u>
Dr. Suraj Kumar	Chief Mentor, Neeti Foundation, New Delhi
Dr. Shailaja Fennell	Smart Villages, University of Cambridge
Dr. Rajat Kathuria	Director and Chief Executive, Indian Council for Research on International Economic Relations (ICRIER), New Delhi
Rakesh Kumar	Director, Ministry of Environment, Forest and Climate Change, Government of India.
Sanjay Kumar	Principal Secretary, Information and Public Relations, Government of Jharkhand
Professor Satyajit Singh	Professor of Political Science, Delhi University
Professor K. Narayanan	Professor of Economics, Indian Institute of Technology, Bombay
Dr. S. K. F. Kujur	Previously with the Government of Jharkhand, and now Consultant to the Auditor General of Afghanistan
S. Ramann	Accountant General (Audit), Ranchi
N. Moyal	Deputy Accountant General, Ranchi
Dr. Kadey Soren	Director (Academics), Kalinga Institute of Industrial Technology (KIIT) and Kalinga Institute of Social Sciences, Bhubaneswar
Shirin Kujur	Senior Manager, CSR, Renew Power Venture Pvt. Ltd.
Manish Kumar Pandey	The Energy and Resources Institute (TERI), Bihar
Ganesh Reddy	CEO, Citizens Foundation, Ranchi
Mahua Chowdhury	Manager, Citizens Foundation, Ranchi
Kulbhusan Bara	Programme Manager, Citizens Foundation, Ranchi
Marion Hanna	Member, Citizens Foundation Ranchi
C. M. P. Sinha	Director, Forest Department, Ranchi
B. N. P. Singh	Retired Bureaucrat, Government of Jharkhand
Suryaprabha Sadasivan	Researcher, Neeti Foundation, New Delhi
Nalini Kaushik	Researcher, Neeti Foundation, New Delhi
Rekha Bhangaonkar	Research Student, University of Cambridge



SMART VILLAGES

New thinking for off-grid communities worldwide

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