



SMART VILLAGES
New thinking for off-grid communities worldwide

European Academies



statement

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Findings and recommendations from the Smart Villages Initiative 2014–2017

Summary for the European Development Community

1 Introduction

This summary of key findings and recommendations of the Smart Villages Initiative over the period 2014–2017 is intended to inform policy-makers and development organisations in the European Union concerned with rural development in Africa, Asia and Latin America. It draws on a detailed report of the findings (Holmes, 2017), which in turn provides links to the wealth of underpinning material generated by the Smart Village Initiative's engagement programmes and research over the 3-year period (available at www.e4sv.org).

The aim of the Smart Villages Initiative has been to identify the framework conditions necessary for the provision of energy services to villages to enable the livelihood opportunities, provision of services (healthcare, education, clean water and sanitation) and empowerment embodied in the Smart Villages concept. In this concept, the provision of sustainable energy services to rural communities, in turn enabling the connectivity made possible by modern information and communication technologies, can have a catalytic impact on the lives of villagers when appropriately integrated with other rural development initiatives (Holmes and van Gevelt, 2015). Smart villages provide many of the benefits of 21st Century life to rural communities, and reflect a level of rural development consistent with achieving the Sustainable Development Goals (SDGs).

A core component of the work of the Smart Villages Initiative over the 3 years has been a series of 30 workshops and capacity building events in six regions (East and West Africa, South and Southeast Asia, South America, and Central America, the Caribbean and Mexico) involving frontline workers (entrepreneurs, non-governmental organisations, development organisations, villagers and civil society organisations), policy-makers and regulators, the finance community, and international experts in science, engineering and the humanities. These workshops in the regions (involving over 1000 participants from around 70 countries) have been complemented by competitions, webinars, impact studies, media and forward-look workshops, and reviews of the literature. In respect of approaches to the provision of electrical services to rural villages, the main focus has been on local solutions generating power at the level of the individual household/enterprise or village, rather than through national grid extension which is often more costly or geographically impracticable.

The Smart Villages Initiative has been undertaken in collaboration with the national science academies and their networks around the world. A key collaboration has been with the European network of national science academies, EASAC (European Academies' Science Advisory Council). This is consequently a joint summary statement prepared by EASAC and the Smart Villages Initiative. Drafting of the statement has been informed by discussions at a workshop held in Brussels on

20 June 2017*, which brought together the European rural development community with representatives of villages in developing countries.

2 The policy context

The overarching policy context for rural energy access and the establishment of smart villages is provided by the '2030 Agenda for Sustainable Development' (United Nations, 2015) which sets out 17 SDGs with 169 associated targets. The SDGs establish a more comprehensive and ambitious agenda than the Millennium Development Goals that they replace, and emphasise the need for an integrated and holistic approach. The United Nations positions them as being of 'unprecedented scope and significance' and reflecting a 'supremely ambitious and transformational vision'. With just 12 years to go (at the time of publication of this statement in 2018) to the 2030 date for achievement of the Goals, time is short and the implementation of the necessary initiatives and mobilisation of the substantial required resources must be pursued urgently (see, for example, Stuart *et al.*, 2016).

The SDGs include Goal 7 on energy access recognising the key role that energy services play in enabling the achievement of other Goals. Rural energy access and the forms of rural development envisaged in the smart villages concept interrelate with the SDGs in many ways, lending weight to the UN proposition that 'the interlinkages and integrated nature of the Sustainable Development Goals are of crucial importance' (United Nations, 2015). Given that nearly 50% of the world's population and 70% of the world's poor live in the countryside, the pledge in the 2030 Agenda that 'no one will be left behind' and the commitment to 'endeavour to reach the furthest behind first' are of particular importance to the Smart Villages Initiative given its focus on rural development catalysed by energy access.

As the world's biggest development actor, spending more on development cooperation than the rest of the world put together (European Union, 2016), the European Union and its Member States will play a key role in actions to deliver the SDGs, and are committed to do so (European Commission, 2016). The European Union's 'New European Consensus on Development' (European Union, 2017), signed on 7 June 2017, reaffirms the eradication of poverty and inequalities as primary objectives and stresses the need for the European Union and its Member States to work better together, using joint programming in partner countries. The New Consensus recognises the

strong interlinkages between the different elements of development action, points to the need to combine traditional development aid with other resources (including leveraging private sector investments), and stresses the creation of better-tailored partnerships with a broader range of stakeholders.

Reflecting the interconnectivity of the 2030 Agenda, the European Commission emphasises the need for policy coherence for development, ensuring that all policies in the European Union and Member States support development objectives. The development of sustainable energy services in developing countries is recognised as a key driver with crosscutting transformational potential.

3 Summary of key findings and recommendations

Key findings and recommendations from the work of the Smart Villages Initiative, and in particular from the engagement activities with frontline workers across Africa, Asia and Latin America, are summarised under six headings as follows:

- 1 Enhancing integration and coordination
- 2 Supportive policy frameworks
- 3 Building markets
- 4 Access to finance
- 5 Science and technology
- 6 Capacity building

A more detailed account of the findings and recommendations is provided in Holmes (2017).

3.1 Enhancing integration and coordination

Typically, village level development initiatives – for example on energy access, connectivity, health and education, productive enterprise, etc. – are undertaken separately and with little or no coordination. Consequently, potential synergies are missed and the full development benefits are not realised. For example, productive enterprises made possible by electricity access increase the incomes of villagers enabling them to afford more electricity, which consequently makes electricity access schemes more financially viable. Similarly, electricity access and connectivity substantially enhance the level of services that can be provided by schools and clinics in villages; provided they are properly funded, they in turn can act as anchor loads for mini-grids increasing revenues and helping to balance the books.

*Smart Rural Development: the SDGs and the New European Consensus on Development': <http://e4sv.org/publication/workshop-report-brussels/>

The current silos need to be replaced by a more integrated approach addressing the development of villages holistically. The smart villages concept provides a framework within which such an integrated approach can appropriately be undertaken. Rural and urban development should be addressed within an integrated regional planning framework which stimulates and intensifies connections between villages and cities, and typically moves villagers from a reliance on subsistence farming to being part of a more open trading economy. In future, development interventions in villages will typically be designed to address several SDGs.

To realise this more integrated approach, much better levels of collaboration are needed between the key players: for example, across government ministries, between different levels of governance (local, regional and national), between the various development organisations, and between the public and private sectors. Within governments, appointment of senior champions with the authority to establish the required integrated working can be helpful. Effective academic support is also needed, requiring interdisciplinary working between the natural, social and engineering sciences.

A particular concern, often expressed by frontline workers, is that there is a lack of coordination between international development organisations, resulting in endless rounds of calls for proposals for relatively small amounts of funding, addressing particular elements of the overall rural development challenge. Better coordination between development organisations should aim to provide a more seamless experience for frontline workers, reducing their transaction costs and enabling them to scale up their activities.

3.2 Supportive policy frameworks

The histories of rural energy access in certain countries (for example, South Korea, China, Chile and Costa Rica) reviewed in van Gevelt and Zhang (2017) demonstrate that effective and supportive policy and regulatory frameworks can enable rapid rural electrification reaping substantial development benefits. To be effective, such policy frameworks need to ensure that initiatives on access to electricity, thermal energy and clean cooking technologies are fully integrated with other aspects of rural development as discussed above. They should be backed by high-level political commitment which is sustained through political cycles.

The policy and regulatory frameworks need to be stable and supportive, providing clarity on the roles of relevant government departments and effective

mechanisms to coordinate their inputs. Policies should be coherent and firmly based in realities, and regulations should provide for simplified and streamlined procedures to reduce the transaction costs incurred by all players, not least the private sector. The frameworks should also include a national energy access plan setting out which areas are planned to get access to the national electricity grid and to liquefied petroleum gas distribution networks, and on what timescale.

Regulations on off-grid tariffs should enable cost recovery by developers if the private sector is to play a role in rural electricity provision: this may require some hard choices given the tensions between the affordability of subsidies to governments and the electricity to villagers, and considerations of equity between rural and urban customers. The private sector has demonstrated its ability to push forward rural energy access: its contribution is in the profitable delivery of goods and services that people want, not just as a source of additional finance as discussed subsequently. Tax exemptions and a minimum of red tape are needed to enable entrepreneurs to get their businesses off the ground. Governments may usefully set up 'one-stop shops' providing a single point of access for licensing and approvals processes, and for the provision of information and advice.

3.3 Building markets

In some areas, such as East Africa, technologies that provide energy services at the individual household level – pico-solar lights, solar home systems and clean cookstoves – are increasingly being sold on a commercial basis, achieving rapid rates of deployment scale-up. Business models based on 'pay-as-you-go' or 'pay for services' approaches, together with big reductions in the costs of solar photovoltaics and increases in the efficiency of appliances have enabled this breakthrough. As costs continue to fall and appliance efficiencies increase, we may anticipate that a greater proportion of rural communities will be able to buy into these technologies, solar home systems will be able to support a wider range of household services and such commercial approaches will be taken up in other areas.

These technologies operating at the household level can make an important contribution by getting households onto the first level of energy access more quickly, particularly for dispersed populations. With universal electricity access by 2030 as the target, the rate of deployment must be further accelerated. To do so, the commercial companies spearheading current progress need to have better access to affordable finance, support from government and development

agencies in establishing the necessary skill base, and to build distribution networks, potentially in collaboration with other organisations providing products and services to rural communities. To overcome recurrent problems of poor-quality products 'spoiling' markets, governments need to put in place effective quality assurance systems.

Governments and development organisations have a key role to play in supporting the creation of effective markets and ecosystems of players (including manufacturers, distributors, retailers, operators, financiers, etc.). Schemes that provide energy technologies to villagers for free hamper the creation of such markets and undermine the sustainability of businesses. They have repeatedly been shown not to work, and they can prolong a counterproductive handout mentality in rural communities. To the extent that subsidies are used to enable access by the poorer segments of rural communities, they need to be carefully targeted and set up so as to complement rather than cut across commercial endeavours.

The step-up to the higher levels of electricity access that can be supplied by mini-grids is largely motivated by their ability to support productive enterprise, and consequently increase the incomes of villagers and their ability to pay for modern energy services. For now, mini-grids typically require some level of subsidy. However, the private sector's entrepreneurial drive, capacity to sustain the operation and maintenance of schemes over time, and capability to undertake vital engagement with villagers point to its important role in moving beyond pilot schemes to the wide-scale and rapid deployment necessary to meet the 2030 universal energy access target. Effective public-private-community partnerships are needed, supported by well-targeted and time-limited subsidies focusing on capital rather than operational costs.

Governments and development organisations should support efforts to reduce mini-grid costs (including through technical developments, economies of scale, reducing setup overheads and financing costs) and to increase revenues (through appropriate tariffs, stimulating productive enterprises, and increasing the load factors and level of connections of schemes). Over time, these developments should reduce the levels of subsidy required, potentially leading to fully commercial operation of mini-grids in due course.

3.4 Access to finance

To achieve universal electricity access and deployment of clean cooking technologies by 2030, the rate of investment needs to be increased substantially:

estimates vary and depend on the level of access targeted, but generally lie in the range of a factor of 3 to 10. Given the limitations on funding available from governments in developing countries and from development organisations, much of this additional funding will need to be found from the private sector. Streamlined access to international funds established to support climate change mitigation could also make a useful contribution.

Governments and development organisations should undertake systematic reviews of sustainable energy supply and use value chains to identify, and plug, any financing gaps, including for the villagers themselves (both women and men). Particular concerns are debt and equity financing for early-stage companies, and the availability of funding in local currencies. To reduce interest rates on loans and to make private sector funds more available, an effective approach can be for governments and development bodies to provide credit guarantees in some form. Governments should also provide stable and supportive policy and regulatory environments to attract private sector capital, and work with private finance organisations to increase their familiarity with the off-grid energy sector.

For companies selling pico-solar lights and solar home systems, concessional donor funds could finance credit risk on the basis that customer repayment records are collated and (appropriately anonymised) made public, thereby building the evidence base of the creditworthiness of the pay-as-you-go sector.

All stakeholders should work together to reduce the transaction costs for companies seeking financing to implement projects and to expand, and for banks, investment bodies, and development organisations which finance projects to supply and use off-grid energy. Potential mechanisms include bundling of projects for financing, taking a regional approach to organising electricity access initiatives addressing clusters of villages, and the formation of cooperatives at the village level. Action should be taken to address the fragmented nature of the funding landscape: one option is to set up an off-grid development and innovation fund which can provide a high profile and single focus for financing to off-grid enterprises.

3.5 Science and technology

With regard to the capacity building element of SDG 17 (target 17.9), governments and development bodies should put in place initiatives to enable closer collaboration between universities and frontline

organisations delivering energy services and making productive use of them. Such research activities need to be informed by the priorities, opportunities and challenges as seen by the villagers themselves, and should focus on frugal innovation and appropriate technology which provide appropriate and affordable solutions to local problems.

Key areas for research and development identified in the workshops include the following.

- To reduce the costs and increase the lifetimes of batteries which are key components of both solar home systems and mini-grids, accounting for a substantial proportion of initial and maintenance costs.
- To make it easier to recycle the components of solar home systems and to develop recycling systems that can be deployed in developing countries.
- To develop intelligent monitoring and control systems able to balance supply and demand both at the household level for solar home systems and the village level for mini-grids, and to facilitate effective repair and maintenance.
- To develop new photovoltaics technologies providing substantial further reductions in cost.
- For solar home systems, further improve their 'plug and play' capability to make them easier to install and maintain, and increase their portability for transient communities.
- To further increase the efficiency of domestic appliances and key technologies used in productive enterprises in villages.

Initiatives should be put in place to expose young people in villages to the new technologies becoming available: they may well come up with innovative ideas as to how they might best be used to improve the lot of rural communities. This applies particularly to innovations in agriculture which will remain the mainstay of the economy of most rural communities: increases in productivity and value added through post-harvest processing, and achieving higher prices in the market through connectivity will be key to achieving the SDGs. A career in agriculture needs to be made attractive to the youth: the new opportunities arising from modern agricultural techniques and being able to sell higher-value products in local, national and international markets make this a realistic proposition.

Better methodologies and measures should be developed to evaluate the development outcomes

resulting from energy access. They should be routinely embedded in all initiatives.

3.6 Capacity building

Shortfalls in skills and capacities are acting as a brake on the deployment of rural energy technologies and their use in supporting productive enterprise and key services. Such skills and capacities are a 'public good', and it therefore falls to governments, supported by development organisations, to take the lead on building them.

Working with local businesses, governments and development organisations should evaluate all stages of value chains to identify shortfalls in skills and capacity. Training programmes should then be put in place to fill the gaps. Government ministries responsible for education, business innovation and development, agriculture and health need to collaborate with energy ministries in identifying and satisfying the need for training programmes.

Governments and development bodies should invest in business incubation and advisory support services, and set up training programmes for village level entrepreneurs in how to run a successful business. Initiatives should ensure that women and marginalised sectors of communities have full access to capacity-building programmes. Technical training and vocational institutions should be set up and run by governments in partnership with entrepreneurs, and located to be readily accessible by rural communities.

International development organisations should support governmental capacity development and awareness raising of the value of a decentralised electricity supply paradigm, including through sharing of experiences between countries. Initiatives are also needed to increase the capacity of the finance sector to evaluate village level projects to supply and productively use energy.

Governments, development bodies and non-governmental organisations should continue to undertake initiatives to increase villagers' awareness of the available off-grid technologies, and the consequent opportunities for productive enterprises and to increase the productivity of their existing activities. 'Seeing is believing' and successful pilots and examples of smart villages need to be promoted to snowball success through replication and imitation. There is value in sharing experiences between rural communities, and taking the example of the Covenant

of Mayors[†], a similar initiative operating at the village level should be considered.

4 Considerations for European development policy

The previous section has summarised the conclusions and recommendations arising from the work of the Smart Villages Initiative in respect of the interventions needed from development organisations and initiatives at the level of the European Union and of its Member States (a more detailed account is set out in Holmes (2017)). The conclusions and recommendations relate directly to the key challenge of poverty eradication, which is central to the SDGs, and to addressing the people, planet and prosperity axes of the 2030 Agenda and of the New European Consensus on Development.

A key aim of the New European Consensus on Development is to enhance the coordination of development interventions undertaken by the European Union and its Member States. The 'views from the frontline' expressed in the workshops undertaken by the Smart Villages Initiative emphasise the importance and urgency of achieving substantially better levels of coordination.

An important issue is to reduce the transaction costs for all players concerned with rural development if the required increase in the pace of change is to be

achieved. The need for many effective interventions at the village level undertaken in close collaboration with the villagers poses particular challenges for European development organisations. Rural communities should be in the driving seat in the sense that decisions on their development path are theirs, albeit informed by advice and expertise from development bodies. Mechanisms should be put in place to ensure that the voices of villagers, including those that may be marginalised within their communities, are heard and acted on by policy-makers and development bodies.

A focus on creating the necessary framework conditions for the participation of the private sector and for public–private–community partnerships in driving forward rural development is one way in which the challenges of effective intervention at the village level can be addressed. Another is to work with national and regional initiatives in the developing world which seek to provide a single source of funding for the range of development initiatives that are necessary.

The European Union's concern to focus on 'actions that meet multiple goals in a coherent way'[‡] points to the Smart Villages concept as an appropriate holistic framework within which to approach rural development. Similarly, by tackling rural poverty, a major root cause of migration to Europe, creating smart villages provides an appropriate response to a topical policy concern.

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[†] <http://www.covenantofmayors.eu>

[‡] Joint public statement: adoption of the new European Consensus on Development: http://europa.eu/rapid/press-release_STATEMENT-17-1547_en.htm

EASAC

EASAC – the European Academies’ Science Advisory Council – is formed by the national science academies of the EU Member States to enable them to collaborate with each other in giving advice to European policy-makers. It thus provides a means for the collective voice of European science to be heard. EASAC was founded in 2001 at the Royal Swedish Academy of Sciences.

Its mission reflects the view of academies that science is central to many aspects of modern life and that an appreciation of the scientific dimension is a pre-requisite to wise policy-making. This view already underpins the work of many academies at national level. With the growing importance of the European Union as an arena for policy, academies recognise that the scope of their advisory functions needs to extend beyond the national to cover also the European level. Here it is often the case that a trans-European grouping can be more effective than a body from a single country. The academies of Europe have therefore formed EASAC so that they can speak with a common voice with the goal of building science into policy at EU level.

Through EASAC, the academies work together to provide independent, expert, evidence-based advice about the scientific aspects of public policy to those who make or influence policy within the European institutions. Drawing on the memberships and networks of the academies, EASAC accesses the best of European science in carrying out its work. Its views are vigorously independent of commercial or political bias, and it is open and transparent in its processes. EASAC aims to deliver advice that is comprehensible, relevant and timely.

EASAC covers all scientific and technical disciplines, and its experts are drawn from all the countries of the European Union. It is funded by the member academies and by contracts with interested bodies. The expert members of EASAC’s working groups give their time free of charge. EASAC has no commercial or business sponsors.

EASAC’s activities include substantive studies of the scientific aspects of policy issues, reviews and advice about specific policy documents, workshops aimed at identifying current scientific thinking about major policy issues or at briefing policy-makers, and short, timely statements on topical subjects.

The EASAC Council has 29 individual members – highly experienced scientists nominated one each by the national science academies of EU Member States, by the Academia Europaea and by ALLEA. The national science academies of Norway and Switzerland are also represented. The Council is supported by a professional Secretariat based at the Leopoldina, the German National Academy of Sciences, in Halle (Saale) and by a Brussels Office at the Royal Academies for Science and the Arts of Belgium. The Council agrees the initiation of projects, appoints members of working groups, reviews drafts and approves reports for publication.

To find out more about EASAC, visit the website – www.easac.eu – or contact the EASAC Secretariat at secretariat@easac.eu

The Smart Villages Initiative

The Smart Villages Initiative aims to provide policymakers, donors and development agencies concerned with rural energy access with new insights on the barriers to energy access in villages in developing countries— technological, financial and political—and how they can be overcome. The Initiative focuses 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. A key 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.

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EASAC, the European Academies' Science Advisory Council, consists of representatives of the following European national academies and academic bodies who have issued this statement:

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