MOTT MACDONALD

Engineering hope

A humane and sustainable solution to the global refugee crisis

Thank you

This report has drawn on the experience, expertise and wisdom of many people. We would like to thank all for their help.

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Engineering hope: at a glance

There are more than 65M displaced people worldwide – the highest number ever recorded – of whom more than 16M are officially classed as refugees.[1] Conflicts, natural disasters and climate change are displacing individuals and entire communities from their homes in ever-greater numbers.

The global refugee crisis is impossible to ignore, but the rest of the world looks on reluctantly. It is a big, difficult 'problem' that haven countries would rather not have to deal with, but must.

Our view is that established responses to the refugee crisis are inadequate and that society can't in good conscience stand by.

We are adding our voice to others calling for change. And in this report we propose a practical, albeit difficult, course of action.

Why read it?

- View the refugee crisis from a new angle
- Challenge preconceptions of what a refugee 'camp' should be
- Look for opportunities to connect with existing partners in new ways, and build entirely new relationships
- Consider how you and your organisation could make a real, practical difference

The world needs a more effective strategy for accommodating refugees

Temporary camps, typically formed of rudimentary shelters, are homes to generations of people – the average length of stay is 17 years.

Although camps are supposed to help refugees, they often lead to markedly worse health outcomes, heightened safety risks, especially for women and girls, and the loss of dignity in oppressive, frequently inhumane conditions.

It is wasteful of human potential, and unjust.

Residents escape conflict and extreme hardship only to find themselves cocooned in 'humanitarian silos', dependent on aid donations and handouts, and cut off from opportunities for education, commerce and employment.

But it doesn't need to be this way

Design and construction technologies, supply chain logistics, infrastructure finance and institutional know-how have reached a level of maturity that makes it possible to address the global refugee crisis in a logical, humane and sustainable way.

'Engineering hope' has grown from an original idea generated by Mott MacDonald's experts, who saw the potential for constructing a high quality physical environment affordably, at scale and at speed, in challenging environments. The structure and emphasis of the report belies its origins and we recognise that what you have before you is very much 'thoughts in progress'.

Those thoughts have embraced the need for health, education, social care, governance, and capable, effective institutions – social infrastructure alongside physical infrastructure. And we have begun to grapple with the make-or-break issue of finance: getting the money in place to build, operate and maintain places where people will actually want to live.

Look on, or play a part?

Our challenge – and invitation – is to form a broad-based coalition to develop and implement the first of a new generation of high-quality, people-centred settlements, which have the potential to become socially and economically sustainable.

By bringing the right skills and resources together, we hope – we believe – it's possible to transform the refugee experience from surviving to living, and the host country's experience from fear to acceptance.

We invite you to get involved in engineering hope.

Changing fortunes: After Tropical Cyclone Winston devastated the town of Rakiraki in Ra province, Fiji, puppeteer Chris Lynch staged performances for, in total, around 1000 children, providing entertainment – but also messages about keeping safe and healthy, and about building a new future.

11 imperatives for change

This report outlines 11 core imperatives for change, summarised below and expanded on in the report.

A wide range of stakeholders is needed to make them happen. We welcome the contribution of any and all who wish to engage.

1.

Build a broad-based coalition

to develop the technical, economic, social and governance dimensions of creating new, sustainable settlements for refugees and displaced people.

2.

Create awareness

among national and regional political leaders and key stakeholders to build interest in, and acceptance of, the settlements.

3.

Develop detailed generic designs

for buildings and infrastructure that can be delivered rapidly in crisis situations, as well as generic urban plans for spatial zoning and the organisation of utilities.

4.

Create a new suite of standards

to govern design and construction of the settlements, so that suppliers can develop sustainable solutions that are a guaranteed fit with those offered by other suppliers, even where construction technologies differ. Over time, these standards can be developed into international standards, and incorporated into national, international and agency agendas.

5.

Create supply chain networks

that integrate the thinking, skills and reach required for locally appropriate solutions.

6.

Design 'blueprints' for governance and essential services

to provide the social infrastructure that is required alongside physical infrastructure.

7.

Establish a global 'social advisory' supply chain

encompassing health, education, social care, development and institutional strengthening.

8.

Develop a strategy to promote integration

between refugees and their host communities.

9.

Appoint an 'overseer'

to manage the relationships between donors, governments and private organisations.

10.

Prepare the ground for funding

with draft public-private partnership guidelines and specimen contracts, including models for the blending of private, public and donor funding, and payback mechanisms.

11.

Identify international ethical investors

that would be willing and able to benefit from investing in the development of sustainable settlements.

An unprecedented challenge

More than half (53%) of the world's 16M refugees come from just three countries – Syria, Afghanistan and Somalia. The majority now live in neighbouring states, which are ill-equipped to cope.

As flight from countries in the grip of war and unrest has escalated into a crisis, the default responses have been revealed as increasingly inadequate and out of step with the real needs of refugees.

Camps of tents or flimsy shelters are the go-to model for accommodating families fleeing conflict or other humanitarian disasters. It's a tactic that has barely changed in 100 years: tented camps were first deployed on a significant scale during the First and Second World Wars, before being used extensively to shelter Palestinian refugees left homeless by the Arab-Israeli conflict in the late 1940s. The world's oldest continuously inhabited refugee camps, in Lebanon, were established 'temporarily' nearly 70 years ago.

"We are witnessing a paradigm change – an unchecked slide into an era in which the scale of global forced displacement, as well as the response required, are now dwarfing anything seen before."[2]

António Guterres,
UN secretary-general and former UN high commissioner for refugees

Desperate acts: Almost 7000 people a day were displaced, globally, in 2015. Iraqi civilians have been fleeing their homes in Mosul to escape conflict between ISIS militants and government forces.

Refugee camps: a short-term fix for an ongoing crisis

The location of refugee camps is a problem. Many of the world's larger settlements, such as the Zaatari refugee camp in Jordan, have populations extending into the hundreds of thousands, so many host governments, understandably, view the idea of building 'permanent' settlements with trepidation.

"There are more than 1M Syrian refugees living in Lebanon," says Dr Hamed Alhamami, the UNESCO representative for education in Lebanon and Syria. "The local population is only about 6M – it's putting immense strain on the country's infrastructure. People don't want to see a large camp being built on their doorstep, at least not one that's going to be there for a long time."

Yet the average stay in a camp now stands at 17 years. "We think of refugee camps as being temporary shelters, but people often end up living in them for many years," says Valerie Bemo, senior programme officer at the Bill & Melinda Gates Foundation.

"There are young adults who have grown up and spent their whole lives in camps – it's their reality," says Marielle Rowan, principal social scientist at Mott MacDonald. "They shouldn't be viewed as refugee camps any longer. They should be turned into settlements – real settlements."

Invariably, building refugee camps that are intended to be temporary means creating structures that are of poor quality, which leads to problems further down the line as the settlements outlive their planned lifespans.

"Millions of people are living in tents year-round through rain and through snow," says UNESCO's Dr Hamed Alhamami "These people are sleeping on dirt floors in areas that are vulnerable to flooding. The situation is inhumane, and it highlights a lack of adequate planning."

5M+

Syrian war refugees in Jordan, Lebanon and Turkey[3]

Climate refugees: Pastoralists in the Ewaso Ngiro river basin in central Kenya have been forced to flee drought.

Why we need a new approach

- On average, **24** individuals around the world were newly displaced during every minute of 2015
- **86%** of the world's refugees are currently hosted by developing countries
- Turkey has the highest international refugee population – **2.5M** – of any nation
- Lebanon now supports **183 refugees per 1000** population – the highest concentration of any country
- Only **25%** of the world's refugees are housed in officially planned camps
- The average stay in a refugee camp lasts **17 years**
- Women make up **51%** of the population in planned refugee camps
- Almost **three fifths** of the managed camp population is younger than 18
- **Two thirds** of refugee children do not attend school
- Women and children are at **high risk** of violence and sexual crime
- **3%** of refugees are older than 60
- **60-80%** of morbidity and mortality in refugee camps is due to measles, diarrheal diseases, acute respiratory infections, malaria and malnutrition
- The rate of unemployment in camps is up to **80%**
- Camps are most often located in areas with **poor resources and vulnerable** to the effects of climate change

All data from UN/UNHCR

A more humane response

Refugees living in these overcrowded camps face numerous health and security risks, as well as extreme economic disadvantages.

Whether accommodation is tented or more substantial, temporary housing is typically low quality and lack the necessities of heating, plumbing and lighting.

And the physical infrastructure that supports today's refugee camps is often inadequate. Latrines, water systems, power grids and other essential facilities are easily overwhelmed to the point of failure either by the numbers of residents using them or by natural events such as rainstorms. In addition, the common lack of accessible biomass resources required to fuel households can leave refugees unable to cook and keep themselves warm.

Chronic and acute diseases, particularly waterborne diseases, flourish.

Deprived of basic social infrastructure – education, social care and governance – and with healthcare provision set up to treat illnesses rather than to prevent them, refugees are involuntarily subjected to relentless 'punishment' over a number of years.

"The situation is dire," says Baroness Nicholson of Winterbourne, founder and executive chair of the AMAR International Charitable Foundation. "The majority of today's camps are hugely overpopulated. Health suffers, education disintegrates and jobs and futures go.

"Clinical depression is a growing issue among camp dwellers. We cannot allow human beings to be treated this way."

A new approach is desperately needed – one that allows refugees to be looked after safely and humanely for as long as is necessary while taking into account the needs and sensitivities of host countries and local communities.

"Refugees need shelter, healthcare, and opportunities for education and for employment," says Rose-Marie de Loor, Mott MacDonald's global lead for international development. "This means developing a huge amount of infrastructure, and doing so in a way that's sustainable. It's a tremendous and complex challenge – but it can't be ignored."

New partnerships needed

"If the comparative advantage of countries like Jordan is to provide a physical haven, because they're near conflict, then the comparative advantage for OECD countries is to incentivise their firms to provide capital and create jobs, because they've got the firms and they've got the money," says Sir Paul Collier, co-author of Refuge: Transforming a Broken Refugee System. "Every country has a duty to help refugees."

He advocates a multilateral, multinational effort, with different nations asked to allocate resources and expertise according to their strengths.

The private sector, meanwhile, can play a vital role in providing innovation and expertise spanning the technical, social and finance dimensions of the challenge, working in partnership with host governments and aid agencies to reduce strain and find better solutions.

No return: The great majority of refugees never return home. 2M Iraqis have fled the country and 1.7M have been internally displaced by the conflict with ISIS militias. 5M Syrian war refugees are in Jordan, Libya and Turkey.

Straight out of the box

The fact is, refugee environments need to be resilient and durable over a long timeframe.

But they must also be quick and easy to assemble and disassemble in crisis and post-crisis situations, and flexible enough to cope with changes – in population, the needs of the camp's inhabitants or, with climate impacts becoming steadily more severe, future environmental threats.

This presents a number of technical challenges.

"You can't design a camp to be there for a year or two and expect it to be functional after 40," says Sabrina Segal, Middle East and North Africa regional director at humanitarian and disaster relief charity RedR UK. "The needs of the people living there are going to grow and evolve over time. Do we introduce a sewage system? Are we putting in paved roads? Do we include a drainage system so that we don't have a standing water problem? These are the kinds of issues that need addressing before the very first resident moves in. Retrofitting a camp is exceptionally difficult."

Built to last?

Prefabricated homes designed to provide temporary, post-disaster relief are typically of poor construction quality: many lack the necessities of heating and plumbing, or the ability to cope with harsh climates and extreme changes in temperatures. With a 50-60m^2 prefabricated shelter typically costing US$3000 or more to build and transport to the site, value for money is poor.

The 'Better Shelter,' designed by furniture company IKEA in partnership with UNHCR, set out to show the impact of superior construction and engineering technology.[4] At a cost of US$1100 per unit compared to US$500 for one of UNHCR's standard tents, the flat-pack Better Shelters are designed to last for three years – six times longer than a tent.

Better Shelter made headlines for the wrong reasons in early 2017 due to concerns over fire resistance. New guidelines on the separation distances between units has been issued and a design review is under way. Nonetheless 30,000 of the shelters are scheduled for use across Africa, Asia, Europe and the Middle East.

In addition to housing, their flexibility allows them to be used as medical facilities and food distribution points, and they are built to withstand extreme cold, heat and rain.

Yet while Better Shelter represents a huge step forward in improving quality of life for refugees, it is a temporary solution – and a shelter, rather than a home.

Other solutions have been tried: "Converted shipping containers were used at the Calais refugee camp in France; in Lagos, Nigeria, they have been suggested as an option for resolving the chronic housing shortage," says Anne Kerr, global head of Mott MacDonald's cities team. "But that's a temporary fix, a sticking plaster. What we are looking for is something that could actually be permanent or at least semi-permanent."

A new way to design and build

"There is huge momentum around exploiting new technologies to rapidly develop towns and cities," says Jo Baker, development director for cities at Mott MacDonald.

Building information modelling (BIM) and design for manufacture and assembly (DfMA), two techniques in increasing use in the engineering and construction industries, could be game changers for the refugee crisis.

"BIM and DfMA make it possible to deliver many thousands of housing units – plus supporting infrastructure – much faster and at far lower cost than is achievable with conventional construction techniques."

Jaimie Johnston
Head of global systems, Bryden Wood

These processes enable mass production of the components needed to build a durable refugee settlement. With BIM and DfMA, an entire settlement can be manufactured remotely and then rapidly constructed on site.

BIM: A design revolution

BIM software enables buildings, facilities and core infrastructure to be designed using intelligent 3D digital models. Designers can select digital components from a BIM catalogue to create a new facility, like building with virtual Lego. It therefore has the potential to dramatically reduce design time. BIM also ensures that the end product is correctly configured, fully costed and compliant with regulations and safety standards.

Each individual component of a building or infrastructure asset is tagged with data on dimensions, weight, materials and power ratings, along with full procurement, assembly, operation and maintenance details. Objects in the BIM catalogue therefore 'know' what they are, and the finished product knows exactly which components it contains. This information makes it possible to automate the manufacture of the components required to create a facility, which can then be rapidly assembled on site.

Simple, scaleable

"BIM is really all about better information management. Taken to an advanced level, we're talking about the creation of a 'digital twin' for the built environment," says Mark Enzer, group technical director at Mott MacDonald. "With this virtual model, you can get it right before you build it in the real world. But, more than that, you can also operate, maintain and use it better."

In the same way that individual components 'know what they are', complete assemblages and units of infrastructure do too. Operating at a master planning scale, it is possible to quantify the demand for essential utility services at the click of a mouse. Modules can be added and taken away according to need. And different options can be tested.

In a refugee settlement, for example, power options might include: equipping every building with combined solar photovoltaic (PV) and thermal energy panels, plus battery storage; creating a central solar PV plant and connecting it to each building; biodigesting municipal waste and sewage sludge to generate power; augmenting local power generation and linking into the area grid; and using mobile diesel-powered generator sets.

DfMA: A rapid, streamlined approach to manufacturing

DfMA is an approach to design that focuses on ease of production and assembly. It is geared to the creation of components, assemblages and modules to high quality, in large volumes, fast and at low cost.

"In terms of speed, the advantage of DfMA over conventional construction techniques is huge," says Enzer. "Time on site can be reduced by as much as 90%."

"DfMA unpicks manufacturing from assembly, which means that they can be done in different places and in different timescales, with logistics providing the connection." The 'design' in DfMA is not just about detailing the components, but also about making sure they are compatible.

A modular manufacturing approach should be geared to producing building and infrastructure components designed for 'mass customisation', meaning many basic elements can be combined in different ways to meet different needs.

Reliance on a limited range of easy-to-replicate components, rather than many unique parts, creates the potential for very significant cost savings.

"With the world going through the third and fourth industrial revolutions, products really do not need to be manufactured through a centralised system anymore."

Andrew Lamb
Innovation advisor, Field Ready

Supply chain advantages

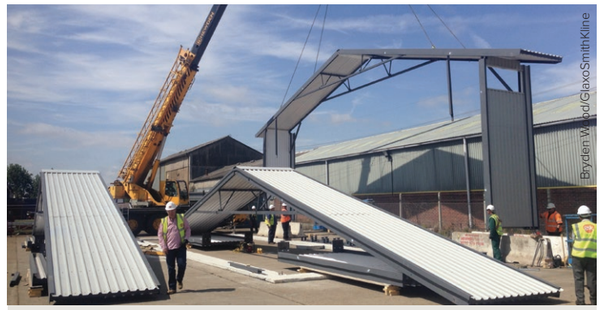
Integrated design, manufacture, logistics and assembly can potentially address a major challenge facing refugee camps.

"If you look at construction sites in typical refugee settlements, the materials often turn up in a really haphazard way," explains Jaimie Johnston, head of global systems at architecture, technology and operations consultancy Bryden Wood. "People don't have the right information or the right training, and that incurs cost and waste."

Projects designed by Bryden Wood have shown that it is possible to build complex structures, to high quality, in challenging locations and using workers with no specialist skills under the supervision of a small expert team. The challenge is to create similar logistical efficiency in a camp setting. DfMA can be used to reduce the physical distances between the factory and assembly site. "The aim is to try and make components as close as possible to their point of use, so that you're not shipping an object hundreds or thousands of miles," says Johnston.

Because it simplifies the assembly process, DfMA can create employment opportunities for local businesses and workers, and for refugees themselves. "The idea is you work with existing supply chains," says Johnston. "Local capability, local people. I think there is a massive opportunity to create employment opportunities for people who desperately need them."

Andrew Lamb, innovation advisor at Field Ready, a disaster relief agency that innovates and applies rapid manufacturing techniques for humanitarian purposes, echoes these views: "In the context of refugee settlements, the more we can encourage local production, the more quickly communities will recover. All value is retained within the local community. And, what's more, local production also resolves many of the logistical issues of supply chain management. With the world going through the third and fourth industrial revolutions, products really do not need to be manufactured through a centralised system anymore."


Bryden Wood/GlaxoSmithKline

Factory in a box: how DfMA is improving access to pharmaceuticals in the developing world

A recent project by drugs company GlaxoSmithKline shows how DfMA can bring critical infrastructure to the developing world.

GSK's new facilities in developing countries were set the challenge of achieving 'zero incident, zero defect and zero waste' construction.

A DfMA solution was developed. It enables components for the factories to be shipped from Europe or procured locally, depending on the capabilities of the local construction industry. Both routes involve flat-packed delivery with all the technology required to produce drugs safely, such as ventilation and hygienic surfaces, ready integrated.

Using DfMA, GSK can create a facility in just 15 weeks with a minimally skilled workforce operating under the guidance of skilled project managers. Previously, it would have taken a year. In future, this could enable the firm to operate in regions such as sub-Saharan Africa quickly, efficiently and to a high standard.


Bryden Wood/GlaxoSmithKline

The manufactured city

High-quality prefabricated modules can provide housing, schools, healthcare facilities and municipal buildings, with essential services including power, communications, water, wastewater and drainage, installed in 'cassettes'.

A major advantage of creating settlements using BIM and DfMA is the method's flexibility. Rather than the default 'one-size-fits-all' approach of today's settlements, the city can be planned around the requirements of the individuals living there.

"When you're talking about refugees, you have to look at the context that they're coming from," says RedR's Sabrina Segal. "The Syria crisis involves an urban, well-educated, sophisticated population, for example. In Kenya's Dadaab camp, on the other hand, much of the population is agrarian. Their needs, while not better or worse, are different."

Robust, sustainable, adaptable

The use of modular construction techniques means a settlement can be enlarged and adapted as the population grows or its needs change.

"The buildings would be built to last, but you can start simply and add new features over time," explains Mott MacDonald's Jo Baker. "A home starts life as a service 'core', providing sanitation and washing on one side, cooking on the other, with perhaps as few as two rooms for living and sleeping. But over the next few years you can add a porch or an extra room – things that make people's lives more comfortable, that you don't necessarily need in the initial aftermath of a crisis."

Such flexibility extends to the entire settlement, so that additional infrastructure can be introduced as the city develops. This presents several advantages over settlements such as the Azraq refugee settlement in Jordan, where, as Segal explains, a lack of flexibility within the original design has caused subsequent problems.

"Azraq was hyper-planned, down to the last metre where a shelter or a water point would be," she says Installed infrastructure is conventional and relatively hard to modify. "This meant it wasn't able to grow organically." Indeed, even minor adaptations to the camp have been disproportionately expensive.

In the manufactured city, the infrastructure could be quickly disassembled or repurposed as necessary. Ideally, all linear infrastructure would be at or above ground level, making it easy to clip in new junctions and extensions, booster pumps or treatment modules. Buildings could be repurposed by reconfiguring components; components themselves could be switched in and out, recycled without loss of quality or any need for modification.

Disassemblable

Importantly, as manufactured cities would be quick and easy to assemble – and dismantle if necessary – they could assuage many of the concerns of governments and local communities, which can be a critical success factor.

"The assumption made by most countries is that any settlement being built on their land is going to be temporary," says Claudio Acioly, head of capacity building at UN-Habitat, the UN's human settlements programme. "However, from experience we know that 'temporary' usually turns out to mean several years or more. Building something that looks too permanent, too inflexible, is likely to unsettle the key decision makers."

It is hoped that, over time, the capacity of these settlements to evolve and adapt to the changing needs of their populations would further help to foster acceptance.

The ability to design and build a temporary/permanent settlement could be one of the keys to overcoming 'not in my back yard' opposition.

Rapid response: The Red Cross rebuilt Vunikavikaloa Arya School, Fiji, with help from the local community after Tropical Cyclone Winston destroyed the original schoolhouse and many local homes.

> “Building something that looks too permanent, too inflexible, is likely to unsettle the key decision makers.”
>
> **Claudio Acioly,**
> Head of capacity building, UN-Habitat

Making manufactured cities a reality

We see the need for an integrator to co-ordinate the design and delivery of next-generation settlements and to ensure efficient communication between the relevant stakeholders.

1. Develop detailed generic designs

Using BIM, a standardised set of designs should be drawn up for buildings and infrastructure that can be delivered rapidly in response to a crisis. Designs should cover housing units and communal buildings such as clinics and schools, as well as infrastructure.

There is also a need for generic urban plans that can direct spatial zoning within settlements, organise utilities, and govern growth.

2. Establish a new suite of standards

There should be clear guidelines governing design and construction of settlements, so that suppliers can develop solutions that fit with those from other suppliers, even where their construction technologies differ. Over time, these guidelines can be developed into international standards, and incorporated into national, international and agency agendas.

There will need to be an open source, digital ‘library’ or catalogue of manufactured cities’ core DfMA components. This will enable developers to quickly plan and manufacture a city simply by selecting components from the catalogue and slotting them together. The use of open source standards will ensure that manufacturers from the haven nation can play a significant role, creating local opportunities and preventing the creation of supply chain monopolies.

3. Form robust procurement models and supply chain networks

BIM and DfMA offer a number of potential advantages in terms of supply chain integration, but their relative newness means there will have to be careful planning around the procurement and delivery of components.

This is particularly vital because many settlements will be located in underdeveloped regions and are geographically close to areas of conflict. There needs to be a transparent logistical model that integrates the thinking, skills and reach required for efficient and locally appropriate delivery.

Geared towards simplicity and speed, the model should remove ‘friction’ between the various stages of the supply chain, and keep the number of links in the chain to a minimum. Forming this sort of network requires close discussion between manufacturers and suppliers, and collaboration with local governments, aid agencies and other organisations with experience in operating in disaster zones and inaccessible regions.

To minimise the complexity of supply chain management, Field Ready’s Andrew Lamb suggests the use of internet-based portals and blockchain-based smart contracts that enable transparent, secure transactions between unconventional partners. “With blockchain, you can issue one contract for 200,000 items. That contract can be automatically distributed across a country or an entire region to a thousand local shops or local manufacturers. They can bid to sell or make, say, 200 items each.”

How technology is already improving lives in refugee camps

Shelter

The Ikea Foundation, in partnership with UNHCR, has developed 'flat-pack' refugee shelters that can be assembled on site without tools. The shelters come equipped with solar panels and include raised wooden flooring to keep out damp and floodwater. The Better Shelter programme aims to supply 30,000 of these housing units. Designs were to be reviewed as this publication went to press, but the programme was backed to continue with an improved product.

Power

Public-private partnerships are exploring renewable energy as a sustainable and low-cost source of power for refugee camps. Among other benefits, having a reliable and affordable energy source can improve camp safety and allow schooling to be provided during periods of darkness.

In 2016, the Ikea Foundation pioneered the use of solar powered lanterns and streetlights in camps. The Foundation is now funding the construction of a solar farm to meet the energy needs of the Azraq refugee camp in Jordan.

The Norwegian Refugee Council is also working at Azraq, training Syrian refugees to install thermal energy panels. The training forms part of an electricity course designed to provide young residents with practical skills that can open up future employment opportunities.

Clean-energy company Circuitree is deploying hybrid ion-saltwater batteries in camps to facilitate the clean and cost-effective storage of solar energy.

Micro-grid technology, which allows energy sources to operate autonomously rather than as part of a wider network, could be a way to provide power to large displaced communities at short notice and without the need for large-scale infrastructure deployment. Firefly Clean Energy is currently exploring its usage in the refugee camp context.

A collaboration between Oxfam and the University of the West of England is exploring ways to generate power from human waste in disaster zones.

Water

Utilities companies including Delphin Water Systems are using containerised water treatment in refugee camps.

Smart technologies have the potential to dramatically improve the efficiency of water and wastewater transmission and treatment.

Low-tech, gravity-fed water filtration and purification systems are still a great option where no power supply is available for mechanical treatment.

Monitoring and data

Drone technology is being used to monitor conditions in refugee camps and assess the needs of their populations. Some camps host more than 100,000 people, and drones quickly feed back information on refugees' needs and assess how assistance can be provided.

Mobile phones

The UN World Food Programme recently introduced a 'digital cash' system at the Kakuma refugee camp in Kenya. Restricted cash transfers are made to camp residents via their mobile phones, allowing them to purchase groceries at selected shops within the settlement. The initiative is helping to support local vendors while also encouraging entrepreneurship within the refugee community.

Mobile phones are also providing medical diagnoses in underdeveloped rural regions that have limited healthcare infrastructure. The UCLA Ozcan Research Group has developed the CelloPhone programme to provide optical imaging platforms that allow aid workers to test for diseases such as malaria and HIV using standard mobile devices.

Mobile phones are also being used to support education, enabling people to access language audio and for example, by technical training content.

Places for people

> “Creating high-quality, affordable shelters is no mean feat.

“But developing the soft infrastructure required to sustain a community is, if anything, even more difficult,” says Mott MacDonald’s Anne Kerr.

To combat the prevailing waste of human potential, lighten the financial burden of running camps, and ameliorate the trauma of being uprooted from their home, it is necessary to provide inhabitants with a semblance of normality – the ability to resume aspects of their previous lives, participate and contribute to society.

Refugee settlements “are societies that have been demolished,” says AMAR’s Baroness Nicholson. “They’ve lost crucial networks. They’ve lost social patterns. They’ve lost classes of behaviour."

Safety first

Rebuilding social structures such as education, training and health requires solid foundations: good governance, law and order. Violence at the hands of other camp residents is compounded by attacks by local inhabitants, and even by police. Sexual- and gender-based violence (SGBV) is a particular issue.

National and local governments often lack the resources to police camps and provide effective security, but relying on aid workers to provide these services brings its own challenges. “The disadvantage of bringing in outsiders to deliver essential services is that they can’t help but bring their own systems,” says Baroness Nicholson. “If what you’re trying to achieve is a fruitful society, with flourishing humans at all levels, then you must help that society to build itself.”

One solution would be to provide resources and skills training to enhance local security networks and, where possible, to draw on person power from the refugee community itself. “Cultural sensitivity is crucial,” says Mott MacDonald director for Iraq and Libya, Bob Phillips. “It makes sense to use local infrastructure as well as people from the community, and to augment this.”

> “Cultural sensitivity is crucial. It makes sense to use local infrastructure as well as people from the community, and to augment this.”
>
> **Bob Phillips**
> Mott MacDonald director for Iraq and Libya

Valerie Bemo of the Bill & Melinda Gates Foundation, agrees. “We need to be working with national institutions and strengthening them by providing them with tools and helping them to organise and prepare for new influxes of migrants,” she says. “We’ve seen in Jordan that a strong government can help to support a harmonious relationship between refugees and nationals.”

An alternative way to mitigate security risks is the ‘charter city’ model proposed by Paul Romer, the World Bank’s new chief economist. Designed for low-income countries, this model would see the host country turning over responsibility for a charter city to a more developed trustee nation, enabling a charter of governance to be created.

A refugee charter city with a clear set of norms based on the effective governance of a trustee nation would allow the population to be governed without burdening the host nation. Wider benefits of charter city status include the ability to allocate resources and tailor internal markets according to opportunities and needs. This could then trigger further economic development.

But charter cities’ potential for achieving social and economic progress – with potential benefits rippling beyond the refugee settlement – is accompanied by quite profound questions to resolve around sovereignty and ‘fit’ with local and national governance.

Smashing the silo

Most refugees find themselves enclosed within 'humanitarian silos', outside everyday society. Unable to access local services, education and employment opportunities, they are denied autonomy and are forced to play a passive role in their destiny.

RedR's Sabrina Segal offers the example of the Azraq refugee camp, a planned settlement in Jordan. "Its location is what will ultimately determine whether it thrives or dies," she says. "Azraq camp is in the middle of the eastern desert. To reach it, you have to drive almost two hours east from Amman, on a desert highway that has nothing around it. There is no freedom of movement: once you are in Azraq camp, you are in Azraq camp.

"People had all the infrastructure they could ever need," she says. "There was clean water, electricity, heating; everything was very organised. But there was no commerce, there was no marketplace, nowhere to go and have your hair cut. The refugees knew their long-term work prospects were non-existent, so many families left."

"A city that can't integrate is effectively a closed system," says Sir Paul Collier. A settlement needs a functional internal economy or marketplace in order to metamorphose from being 'temporary' into a living, breathing community. And to do that it needs to be connected to its wider social and economic environment.

"To grow and thrive, [a refugee settlement] has to be plugged into the local economy as well as the wider global economy." Without a productive internal economy and wider links, a settlement and its residents are doomed to a life of waiting for handouts: "Since it will need goods coming in, which it won't be able to pay for, it will run a sort of balance of payments deficit and will require a continuous stream of aid to support that," Sir Paul Collier says.

Location, location, location

"The number one thing for a settlement to be successful and sustainable is the choice of site – your location," says Mott MacDonald's Bob Phillips. "It's not a case of choosing any empty spot on the map. It's a matter of paying proper attention to simple but hugely important logistical matters."

These include access to economic and social services beside suitability for construction; access to sustainable water resources and infrastructure services; resilience against climate and other natural events; and safety and security.

Sir Paul Collier agrees: "Most refugee camps are in the wrong place. All cities require an export base through which to generate internal economic activity."

Where possible, a new settlement should be positioned as a satellite of an existing town. "Establishing a settlement as a satellite allows it to tap into the various infrastructure of the local area," says Phillips. "It makes it much easier to establish the city and to sustain it over a long period."

RedR's Segal compares the isolation of Azraq with the Zaatari refugee camp – also in Jordan – an unplanned settlement that grew organically close to the city of Mafraq. "It made it very easy for people to come and go, so they could engage in commerce. It was very community-centric: children are going to school, people are selling falafel. It is a town."

Site selection is therefore a fundamentally important issue. Bob Phillips recommends that "screening and pre-selection" be carried out in countries likely to become destinations for large numbers of refugees. National and local authorities need to be engaged in the process. "The ideal would be to know, far in advance of a crisis unfolding, where a settlement might best be sited and how it would be used – to have a plan in place, and to know how the local linkages could work."

"[The UN's vision] is that education, health, sanitation and other services are provided by the authorities in the host country or through bilateral development support. Refugees are therefore seen as assets – they're contributing to the economy."

Daniel Endres
Director, comprehensive responses, UNHCR

Opportunity in the palm of a hand

Digital connectivity is vital to ensuring the long-term success of refugee settlements. In emerging equally as much as in developed economies, high-speed broadband opens up opportunities for entrepreneurship, education, commerce and banking. Digital connectivity takes different forms; and in developing locations mobile networks may be more affordable and feasible than fixed infrastructure.

Processes of empowerment

The IKEA Foundation has invested in transforming camps at Dollo Ado in Southern Ethiopia, which are home to about 200,000 Somali refugees. The Foundation has helped to restructure the camps, while also supporting small-scale farming by irrigating nearly 1000ha of land and donating livestock to refugee families. In Jordan, IKEA is to open production centres in refugee camps as part of a long-term plan to create employment through social entrepreneurship programmes.

The Tent Foundation offers grants of up to US$50,000 to organisations working to promote the social and economic integration of refugees and other displaced people.

Autonomy through employment

"It's completely insulting to refugees to infantilise them by making the priority free food, free shelter," argues Sir Paul Collier. "The primary duty of rescue towards today's refugees should be to restore as much normality as possible. Autonomy essentially means the capacity to earn a living."

The right to work is enshrined in international law, but in practice refugees face myriad obstacles in many haven countries.

"The argument for using public money to incentivise firms to create jobs is much more powerful in the case of refugees than it is in other situations, as the need to restore autonomy is urgent," he says.

It is also essential to create benefits for the haven nation and local population. "The only basis on which poor haven governments will co-operate with the global duty of refuge will be if it's sufficiently in the interest of their own citizens," says Sir Paul Collier.

A question of scale

With refugee populations in many states extending into the hundreds of thousands, allowing blanket access to labour markets would risk severely destabilising the local economy. Can refugees be integrated without disadvantaging local workers?

One potential solution is the special economic zone (SEZ) model. Put forward by Sir Paul Collier and Professor Alexander Betts, of the University of Oxford's Refugee Studies Centre, the model offers special international trade privileges to haven countries that grant displaced people the right to work in these zones.[5]

The initiative is being trialled in Jordan, which has allowed European Union trade concessions on 52 product groups that are being manufactured in SEZs. Producers in the zones are required to have a minimum 15% Syrian participation in their workforce, rising to 25% after three years.

There are challenges, however. "For a Jordanian company to profit from this deal, they need to be able to source trained Syrian workers or train them themselves," says Jeffrey Tudor, head of the UK Department for International Development's Jordan programme. "Not all companies have the necessary resources, so we're looking at ways we can help them do this."

Shared benefits: Assistance needs to benefit the local population as well as refugees. The UK Department for International Development is strengthening Lebanon's schools to improve education for Syrian refugees and local children.

> "The only basis on which poor haven governments will co-operate with the global duty of refuge will be if it's sufficiently in the interest of their own citizens."
>
> **Sir Paul Collier**
> Co-author, Refuge: Transforming a Broken Refugee System

11 bold commitments

In 2016 the UN published the New York Declaration for Refugees and Migrants[6] which sets out 11 bold commitments to address today's issues and prepare for future challenges. It was signed by all members of the General Assembly. The commitments form the backbone of a Global Compact for Refugees that the UN will introduce in February 2018.

1. Protect the human rights of all refugees and migrants, regardless of status. This includes the rights of women and girls and promoting their full, equal and meaningful participation in finding solutions.
2. Ensure that all refugee and migrant children are receiving education within a few months of arrival.
3. Prevent and respond to sexual and gender-based violence.
4. Support those countries rescuing, receiving and hosting large numbers of refugees and migrants.
5. Work towards ending the practice of detaining children for the purposes of determining their migration status.
6. Strongly condemn xenophobia against refugees and migrants and support a global campaign to counter it.
7. Strengthen the positive contributions made by migrants to economic and social development in their haven countries.
8. Improve the delivery of humanitarian and development assistance to those countries most affected, including through innovative multilateral financial solutions, with the goal of closing all funding gaps.
9. Implement a comprehensive refugee response, based on a new framework that sets out the responsibility of UN member states, civil society partners and the UN itself, whenever there is a large movement of refugees or a protracted refugee situation.
10. Find new homes for all refugees identified by UNHCR as needing resettlement; and expand the opportunities for refugees to relocate to other countries through, for example, labour mobility or education schemes.
11. Strengthen the global governance of migration by bringing the International Organization for Migration into the UN system.

Stepping stones to salvation

"For a society to be able to regather itself it must include schools, it must include health and training facilities – it must include the capacity to bring youngsters to a condition whereby they can go forward," says AMAR's Baroness Nicholson.

Like the challenge of integrating working-age refugees into the local employment market, the scale of providing education, training and preventative health and socialcare presents a real obstacle, calling for specialist assistance.

Shipping in teachers in the numbers required to meet the education and training need in a large camp is logistically impossible, and local schools and colleges will often be far over-stretched to meet the needs of additional, refugee, children.

Recognising this, the UK's Department for International Development (DFID) has committed £20M to provide schooling opportunities for Syrian child refugees in Lebanon, as well as vulnerable Lebanese children. The initiative supports the Lebanese school system, which is struggling to cope with an influx of refugee students, and will provide classes in literacy, mathematics and languages to 30,000 children who are unable to attend school. The programme is being implemented with the assistance of specialist advisors who bring the right blend of skills to understand problems and solve them.

Specialist advisors' skills typically include gap analysis to identify the 'deficit' in teaching capacity, and political, social and economic barriers. These might include attitudes to the education of girls and women. They also bring the know-how to create and run teacher training programmes. They will bring administrative, governance, finance and regulatory expertise to enable everything from the procurement of teaching resources and supervision of standards to payroll and building maintenance. Programme and fund management are also essential skills, to ensure that the many workstreams involved in building or strengthening an education system are effectively co-ordinated and that the many suppliers involved deliver value for money. And not least, they can offer proven methods and innovations for stakeholder engagement and social inclusion.

(Specialist advisors offer similar advantages in the fields of health and social care.)

"There is a temptation to go for easy wins, like building a school. But with a school alone you can't provide education. You need to address longer-term needs: the resources for maintenance, to train and pay teachers, and equip classrooms with books."

Marielle Rowan
Principal social scientist, Mott MacDonald

Shared benefits

Because the ambition is to integrate refugees with haven communities and habilitate them into society, often the best solutions for education, training and healthcare involve working to improve the quality of education for locals and refugees alike. This requires strong stakeholder engagement and management skills, involving innovative methods for communicating with the local population and advocacy at national and local government levels.

"Experience from the Balkans to Sudan is that conditions and prospects for refugees will be best when the benefits of interventions to help them are shared more widely," comments Mott MacDonald's Rose-Marie de Loor. "When the local population gains improved education, better healthcare, and is offered training that makes them more employable, fear and resentment of the incomers is reduced."

Increasingly, private sector specialists are providing advice to governments on vocational training, helping to identify the skills needed to propel economic growth in key industries, and to plug those skills gaps.

Mott MacDonald's Marielle Rowan notes that many refugees have strong skills and advocates the creation of a 'skills exchange' system for matching them with local employer needs. Paid apprenticeships and internships could also provide an incentive for refugees and real benefits for employers.

Tapping potential

"As refugees are presented with opportunities to showcase their talents, acceptance of them, and the settlements housing them, is only likely to grow," Rowan believes. In addition to benefiting local economies, allowing refugees to earn a living would greatly reduce the current pressures on the global humanitarian system, alleviate the need for long-term support, and pave the way for refugee settlements to become self-sustaining.

The principles are borne out in practice in Uganda, which the UNHCR's Daniel Endres says is one of the few countries currently demonstrating a positive approach towards integrating refugees. Uganda's refugees have freedom of movement, work and settlement. The University of Oxford's Refugee Studies Centre has found that a fifth of the 200,000 registered refugees in the capital, Kampala, run businesses that employ one or more other people, 40% of whom are Ugandan citizens.[7]

And DFID's Jeffrey Tudor notes that the skills of Syrian migrants living in neighbouring countries are gradually being recognised: "Syrians are entrepreneurial, service-orientated people. Many businesspeople in Lebanon and Jordan see them as a potential net benefit to society."

Making the money work

Is a better solution affordable?

Funding for refugee camps is co-ordinated by UNHCR, which oversees a cluster of agencies including the World Health Organization, the International Federation for the Red Cross, Red Crescent, UNICEF and UN-Habitat. Each of these gives money based on pooled funding that they receive from government donations, which are then ‘piece-mealed’ into various camps.

The system was set up to respond to emergency situations – and does so well. But there is an obvious lack of sustainable funding, or a long-term plan.

As refugee settlements outlive their intended lifespan, the funding model quickly breaks down. “UNHCR gets utterly desperate when people stay in camps for long, because nations aren’t willing to give any more money,” says AMAR’s Baroness Nicholson. “After 10 years, finance all but dries up.”

And with the number of displaced individuals constantly rising, the UNCHR and its partner organisations are struggling to meet the ever-rising cost of supporting the global refugee crisis.

“The current funding model is totally uncreative,” Baroness Nicholson summarises. “It doesn’t work.”

Between 2012 and 2016, the annual global funding requirement of UNHCR, including supplementary requirements, rose 76% from US$4.26bn to US$7.5bn. Funding from donor governments amounted to US$3.9bn in 2016 – only half of the organisation’s requirement for the year.[8]

“A sustainable response to the refugee crisis will require significant improvements to the existing funding model,” says Dr Jeff Crisp, an associate fellow at Chatham House and the former head of policy development and evaluation at UNHCR.

> “Never before has UNHCR had to manage its programmed operations with such a high funding gap between approved budgetary requirements and funds received.”
>
> **UNHCR**

Self-support network: Enabling commerce and entrepreneurship lays the foundations for increasing economic self-sufficiency and growth, which ultimately enables revenue to be generated through rent and service charges, offering return on investment.

New thinking needed

Organisations such as UN-Habitat are looking to the private sector to help put refugee settlements onto a sustainable footing. “We’re trying to engage the private sector in areas that are usually handled by governments,” says Claudio Acioly, head of capacity building at UN-Habitat. “As well as much-needed finance, public-private partnerships can bring innovation and another layer of efficiency.”

“Innovative multilateral financial solutions” in place of the current donation system is one of the 11 requirements written into the New York Declaration for Refugees and Migrants (see page 29).

Mott MacDonald’s Bob Phillips sees the opportunity to tap into technical know-how as well as different approaches to finance: “Donors and host governments alone cannot bear the cost of creating and maintaining the infrastructure needed to make rapid urbanisation a reality. The situation requires a company that understands the cost of running such a massive enterprise. The private sector must be involved in any solution that’s put forward.”

> “The delivery of sustainable refugee settlements must be led by a group of public- and private-sector organisations with a proven background in city development and engineering. It’s complicated and people need to roll up their sleeves.”
>
> **Matthew Jordan-Tank**
> Head of infrastructure policy, European Bank for Reconstruction & Development (EBRD)

Courting the private sector

Under a PPP framework, funds from aid agencies, host governments and international financial institutions can be blended with investment from the private sector to finance development. This would include the provision of buildings and core infrastructure, and may extend to the delivery of services such as energy, water, waste management and building maintenance.

As the economy of the settlement flourishes over time, the value of initial assets – housing and infrastructure – will increase, providing return on the investment. Repayment (with profit) comes through revenue streams, such as rent on accommodation and fees for the provision of services.

“While any model will require some initial investment, with the right structure, refugee settlements can become self-financing over time,” says Matthew Jordan-Tank, head of infrastructure policy at the European Bank for Reconstruction & Development (EBRD), which has been investing in infrastructure in areas of Turkey, Jordan, Egypt and North Africa affected by the refugee crisis and migration.

“In general, refugees have an incredible amount of energy and drive. In my opinion, what one needs to provide is the framework for rebuilding lives and livelihoods – such as housing, infrastructure, including schools and healthcare, and access to the labour market – and it will happen. Of course, opening up vocational education opportunities would be very complementary to all of the above as well. Any return on investment will come from the increase in value of the urban asset over time.”

These views are corroborated by Oumar Sylla, unit leader at UN-Habitat, who sees refugee settlements as potential centres of commercial activity: “Once you have initial investment capital you attract new businesses and entrepreneurs to the area and are able to generate more jobs. It’s a win-win for everyone.”

SEZ-ing the opportunity

According to EBRD’s Jordan-Tank, deploying the new settlements as Special Economic Zones (SEZs) can help to attract private sector investment. “The host government can make the city an SEZ and provide incentives such as reduced business tax or property tax to encourage the private sector to invest in the area,” he explains. “This will usually be accompanied by public investment in basic infrastructure to make the investment opportunity even more attractive.”

International financial institutions and donors can prime areas for private sector investment, as is already happening: In 2016 the International Development Association, part of the World Bank, created a US$2.5bn fund to incentivise companies to invest in underdeveloped or inaccessible regions.

In order to protect the long-term interests of all stakeholders, it is critical that the city is carefully planned and managed from the outset. “For private companies to invest, settlements must be built for the long term – not as five or 10-year projects,” says Jordan-Tank. “Eventually they should just become part of the region – fully established cities.”

Working for all

In particular, settlements must be integrated with both the physical infrastructure and wider economy of the host country, in a way that benefits both refugees and local communities.

“For a private financing model to work, there needs to be engagement and collaboration with local communities to make sure they are benefiting from the investment, as well as refugees and investors,” explains Sylla.

Jordan-Tank agrees: “The infrastructure of the new settlement should connect with that of the host country. That includes energy distribution, roads, public transport, water and solid waste.

“This requires sitting down with the regional authorities and the neighbouring cities and figuring out the scope of the settlement, and what each phase of development will entail.” It also involves figuring out what the local, regional and even national infrastructure needs are.

“Many developing countries – regardless of whether they host refugees or not – need to build cities to accommodate a growing population,” Jordan-Tank explains. “Ideally, new settlements would accommodate both refugees and some of the local population. This makes the prospect of creating such a settlement more politically appealing and reduces the stigmatisation of refugees. It also provides reassurance to investors, as if a certain proportion of the city moves on, other people will move in.”

> “Working with specialist partners from the private sector helps humanitarian organisations to deliver projects that have a greater impact on people’s lives and societies they live in.”
>
> **Erik Abild**
> Director of partnerships and policy, Norwegian Refugee Council

Integrated thinking: Refugees's skills and energy can boost the economy of haven cities and nations. Uganda is home to several hundreds of thousands of refugees who are contributing to industries, such as textiles, with global reach.

Managing risk and reward
Careful governance and risk management are required to reassure investors.

"IFIs and donors can participate in a multiparty fund that is administered by a third party," says Jordan-Tank. "A commission should be set up to make sure that both the private and public sides to the investment are being undertaken with due care. And it's critical that it is not just bureaucrats that run the project. It must be led by professional people from the public and private sectors, who have experience in city development."

'Bundled' PPPs, which contract private sector firms to deliver both the initial asset and its ongoing maintenance, can help to attract larger, more experienced market participants. One example is the design-build-finance-operate-maintain (DBFOM) model, under which all these responsibilities are transferred to, typically, a consortium of private sector partners which between them can deliver the full bundle. As well as providing greater value for money through life-cycle costing, DBFOM projects leverage future revenues to issue bonds or other debt that provide funds for capital development and maintenance projects. They are also often supplemented by public sector grants in the form of money or contributions in kind.

"Bundling multiple related assets into a single coherent package makes it a much more attractive prospect for private investors," explains John Seed, global sector leader for advisory services at Mott MacDonald. "It enables them to clearly see where the future revenue streams will come from, and helps to guarantee a return on investment."

How PPPs can work in practice: key pointers

- Within the PPP framework, funds from aid agencies, governments and international financial institutions can be blended with finance from the private sector.
- The PPP fund can be used to finance the development of buildings and supporting infrastructure on the premise that settlements will become financially self-sustaining and create wealth in the future.
- Investors would make a return on their investment through the increased value of assets over time, as well as through user fees/service charges.
- Governments can help stimulate economic growth and ROI by conferring Special Economic Zone status on settlements.
- A 'land development agency' made up of property developers, local government representatives and aid agencies should be established at the start of the project, to ensure that funds are carefully managed throughout each stage of delivery.
- In some cases, the PPP fund should be managed through a third party, to ensure the private and public tranches of the investment are managed with due care.

Unchaining finance

Internet-based systems such as blockchain, which are used for trading data and currency, enable everything from the pooling of large-scale funds to the exchange of small sums for goods, services or information. They are accessible, transparent and secure, and help to reduce the costs, risks and complexities around providing finance in developing locations. As well as providing ways to blend and disburse funding from different sources, blockchain can improve financial inclusion by enabling communities with no access to conventional banking to securely transfer money.

Changing the model

To stand a chance of getting private capital involved, we believe the following steps will be needed.

1. Appoint an 'overseer'
An international agency or coalition of agencies will need to be appointed to manage the complex relationships between donors, governments and private organisations – making sure that all parties understand and fulfil their obligations to one another.

"For an integrated approach to work, you need to have clear leadership," says UN-Habitat's Oumar Sylla. "You need an organisation that can be trusted to oversee the work of different communities, who can establish rules and maintain a sense of order."

As RedR's Sabrina Segal suggests: "The private sector doesn't currently sit at the table with governments when it comes to housing vulnerable populations or displaced people. A realistic scenario would be to have these companies working very closely with the UN, and working within the existing framework as part of a larger humanitarian ecosystem."

As part of its role, the overseer will also be responsible for monitoring and safeguarding the relationship with private companies to ensure that every party keeps to its commitments.

2. Identify ethical investors
The right investors will have the desire and capacity to finance and support one or more refugee settlements over a sustained period. In addition, they will have an appetite for large and diverse projects with complex or blended revenues, and for innovation in delivery and project management.

Investor selection might involve the creation of a committee composed of participants with backgrounds in humanitarian projects and global initiatives with significant private sector involvement.

There are a growing number of assessment 'tools' that enable investors and projects to be screened against, for example, economic, social and environmental sustainability criteria. They serve to identify and manage risks on both sides, helping to marry the right investor with the right opportunity. The tools can also be used to measure performance over the lifetime of the project to provide reassurance that both parties are meeting targets.

3. Prepare the ground for funding
To make a success of a PPP or similar private finance model, there will need to be a mechanism in place to ensure that investors fulfil their long-term obligations to refugees and local communities.

Equally, investors need assurance that their revenues will be reliable for a defined period so that they can earn back their capital with a reasonable return.

A comprehensive set of PPP guidelines and specimen contracts should be drafted by participants with the right expertise – for example, an international investment institution, such as the World Bank or IMF, or an investment bank.

The guidelines should include models for blending private, public and donor funding, as well as payback mechanisms to safeguard the long-term sustainability of individual financing arrangements.

4. Incentivise performance and efficiency
PPP has a strong track record of driving technical, supply chain, procurement and project/programme management innovations.

Delivery partners and concessionaires need opportunities and encouragement to innovate and achieve efficiencies from project inception to operation. This should be focused on outcomes – clear definitions of 'success' – and not on specified outputs, allowing the provider to select their own operational way of delivering the desired result.

Performance should be underpinned with contractual reward mechanisms, fairly compensating for risk and ability to deliver added value.

5. Identify all potential funding streams
A sustainable fund for projects and paying investors back over defined operating periods needs to be created by identifying all potential funding streams and means of blending them. This should include calculations of uplift in asset value, revenues from buildings and infrastructure, government grants, inward private investment, and ongoing donor funding streams.

Forward motion: Led by the World Bank, donors to Nepal are pushing for legislative and regulatory reforms to sustain economic growth that is accompanying reconstruction after the devastating 2015 earthquakes. Improving prospects for women and children is a particular focus.

Time for action

Different strokes: The 'right' response to the refugee crisis is different in every setting. Small-scale market gardening is part of an initiative to go beyond food self-sufficiency and create export opportunities in Uganda.

The refugee crisis is intensifying. The world doesn't have a solution that is fit for purpose.

It is a situation that demands attention. It needs new thinking. It requires action.

The time for action is now.

Correctly planned and designed, sustainable refugee settlements can bring huge benefits both to refugees, and to the countries that host them.

Risk- and opportunity-aware

We recognise that there is much leading thought and analysis on the refugee challenge. We have set out in this report to draw some of those strands together in different ways, to open up new discussions. Ultimately, we want to see the UN's 11th Sustainable Development Goal – making cities and human settlements inclusive, safe, resilient and sustainable – realised for refugees.[9]

We propose assembling a broad-based coalition to develop the technical, economic, social and governance dimensions of settlements that are truly fit to live in – to create a deliverable vision that can be shared with local, regional, national and international leaders, as well as with lenders, donors, IFIs and private sector investors.

This multidisciplinary partnership should consist of humanitarian organisations, political leaders, and other experts involved in helping to alleviate the refugee crisis, as well technical, healthcare, education, social care and financial experts, drawn from across the public and private sectors.

The following are, we believe, among the key players

Land use and resource planners, engineers, climate specialists, architects, construction and facilities management contractors	• Provide the know-how to identify and master plan sites • Design, fabricate, construct, operate, maintain and adapt (and dismantle) settlements
Development consultants, technical advisors, aid agencies and civil society organisations	• Provide experience to bridge between the social and technical dimensions of the response, to ensure that the right physical and social infrastructure are put in place quickly • Offer expertise in stakeholder engagement and institutional capacity building
Donor governments and international financial institutions	• Provide funding/loans that pave the way for private sector investment • Establish financial 'foundations' by working with private sector investors to structure finance and secure reliable long-term return on investment
Private investors and businesses	• Work with partners to manage, price and apportion risk appropriately; drive innovation and efficiency across the provision of physical and social infrastructure • Help to develop commercial and employment opportunities
Academic institutions, think tanks and research councils	• Work with all other stakeholders to explore the technical-social-economic fit required to make settlements viable
Lawyers	• Develop robust specimen contracts, in particular around blended funding models • Manage land rights • Provide guidance on legislation associated with governance, SEZ status and charter cities
Programme managers	• Manage project delivery • Assess performance and administer the disbursement of funds

Let's get started

We propose that the first steps should be to:

Establish an advisory panel that disseminates knowledge, skills and experience, and creates and promotes a set of international standards for the new generation of liveable settlements.

Create a specific fund and an inter-agency trust to manage it. The trust should be able to advise on the contracting and regulatory frameworks required to deploy funds effectively and accountably. The funding model should be developed around clear guidelines for selecting the right private sector partners; and for managing relationships to ensure that the commitments made on each side of the partnership are fulfilled.

Develop off-the-shelf, scaleable and flexible designs to enable developers to quickly plan and manufacture a city in the event of a crisis. There should be a full, open source BIM component catalogue for buildings and infrastructure that can be delivered using DfMA. Organisations offering expertise in building design, engineering and construction – and specifically those with experience in BIM and DfMA – should lead this process.

Create a 'social infratructure task force' with the skills to address everything from governance, law and order, through the promotion of social inclusion, to the provision of education, training, health and social care. The task force should provide a forum for the sharing and promotion of best practice and innovation.

Create a pilot settlement in a location that is welcoming of refugees and supportive of the idea of sustainable settlements. The settlement should be established as a satellite of an existing town or city to facilitate integration between refugees and communities, especially if this can be done in a way that engages the local community. The host governments and local communities should be made aware of the benefits of accepting the camp and offered clear incentives for doing so, such as favourable trade packages or incentives for local firms to hire refugee workers.

We are confident that, with participation from the key players above, we can begin the process of transforming the way refugees are housed, treated and perceived. Together, we can create a brighter and more prosperous future for millions of refugees worldwide, as well as the countries they seek haven in.

Together, we can engineer hope.

Footnotes

1 www.unhcr.org/afr/news/latest/2016/6/5763b65a4/global-forced-displacement-hits-record-high.html
2 data.unhcr.org/syrianrefugees/regional.php
3 www.unhcr.org/uk/news/latest/2015/6/558193896/worldwide-displacement-hits-all-time-high-war persecution-increase.html
4 www.bettershelter.org/about/
5 www.rsc.ox.ac.uk/news/jordan2019s-refugee-experiment-a-new-model-for-helping-the-displaced-in-jordan-alexander-betts
6 refugeesmigrants.un.org/declaration
7 www.rsc.ox.ac.uk/policy/refugee-economies-in-uganda
8 reporting.unhcr.org/financial
9 unstats.un.org/sdgs/files/report/2016/secretary-general-sdg-report-2016--EN.pdf
To this end, we believe that the technical-social-financial proposition presented in this report can be applied in any 'urbanisation' situation, including cities experiencing rapid population growth and slum replacement/improvement.

Next steps

With the right engagement we think it is possible to create a pilot settlement by 2020. To get there we need to start a dialogue and build a community of interest.

If you would like to discuss the part your organisation can play, whether technical, social, economic or institutional, we would love to hear from you – and will be organising follow-up events to move the agenda forward.

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Opening opportunities with connected thinking.