FUTURARC

INDUSTRIAL ARCHITECTURE

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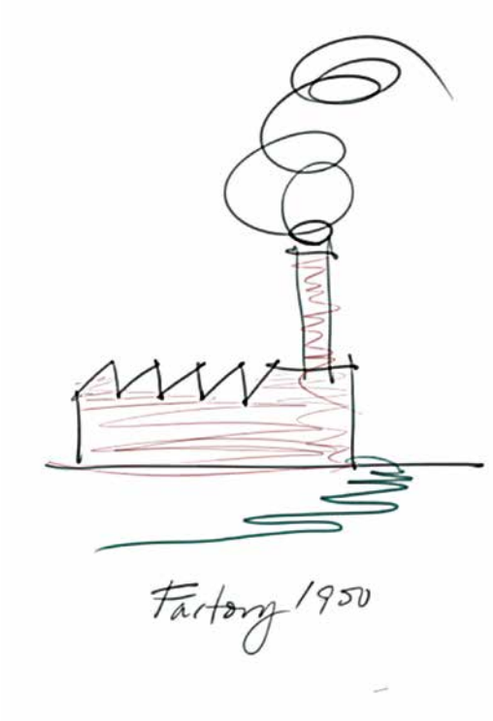
The Voice of Green Architecture in Asia-Pacific





Mar-Apr 2017 | volume 53

# Industrial Architecture

*Inside:* **Industrial Architecture** – *From Machine to Habitat* | **Paramit's Factory in the Forest** – *Malaysia* | **William McDonough's Method South Side Soapbox** – *USA* | **Suhasini Ayer-Guigan** – *Architect and Co-founder, Auroville, India*

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# Letter from the editor

**Dear *FuturArc* Readers,**

The numbers tell a story. It's been reported that in 1990, "Asia accounted for 26.5 percent of global manufacturing output. By 2013, this had reached 46.5 percent" (*The Economist*, 14 March 2015). China alone accounted for half of all output in Asia. Behind this trajectory, there is a secondary narrative. Countries like Singapore transitioned from a labour-intensive economy—producing garments and textiles in the '60s—to a knowledge-based one, investing now in high-value sectors like biotechnology, environmental and water technologies. The phases of Singapore's manufacturing history are snapshots of Asia today—some places low-tech, some high—driven in part by wages. China, where the average factory worker earns US$27.50 per day, is losing factories to parts of ASEAN; the wage in Indonesia, for instance, is US$8.60; in Vietnam, US$6.70.

Industrial growth brings jobs but, if poorly regulated, it comes at an environmental and human cost—especially at the bottom end of the manufacturing pyramid. A sweatshop, for instance, is rarely a high-end semi-conductor factory where workers are educated and informed of their rights; the garment factory that burns down is as poorly designed as it is managed. People living in informal settlements often depend on factories for jobs, the same ones that spew waste into the waterways.

This issue examines two questions affecting industrial architecture: How might a factory become a responsible citizen of the community and planet? How might it become more people-centric, focused on health and dignity? The answer lies somewhere between design thinking and corporate ethics.

Let's start with design.

Paramit's Factory in the Forest (page 22) looks like no factory we've seen. It could, at first glance, be mistaken for an institutional development. An overarching canopy delineates in-between spaces, one that blurs the boundary between indoors and outdoors. What's important here is the logic implicit in form, the goal of a biophilic experience—links to greenery, daylight and views—as the first step to well-being. The sidebar (page 32) explains the further integration of human comfort with energy performance.

The factories in India (page 66) aren't much to look at but they are exemplary by way of corporate ethics. There are many initiatives here, some lowering environmental impact, others promoting social and community engagement. William McDonough's Method factory in the USA (page 50) is a sterling example that shows how this type of corporate thinking connects with design actions.

Finally, in this issue, we see industries for a new age: solar farm (page 48), waste-to-energy plant (page 40) and organic food farm (page 34). These do not have clear antecedents in industrial architecture, and so there are some interesting innovations of form. The solar plant in Rajasthan, for instance, generates power and collects water in a desert climate. The energy-to-waste plant in Shenzhen presents an almost classical arrangement of elements with strong geometry and symmetry.

Remember that none of this means much without good governance. Policies on resource use and waste management will shape the factories, plants and warehouses of the future. Corporate accountability to these policies and an empowered workforce will translate to meaningful action. In this issue, we offer a glimpse of what that confluence might look like.

Happy reading.

**Dr Nirmal Kishnani**
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*Cover image: The clean factory of today in comparison with the dirty, polluting factories of yesterday. Drawing courtesy of William McDonough + Partners; Method South Side Soapbox by William McDonough + Partners*

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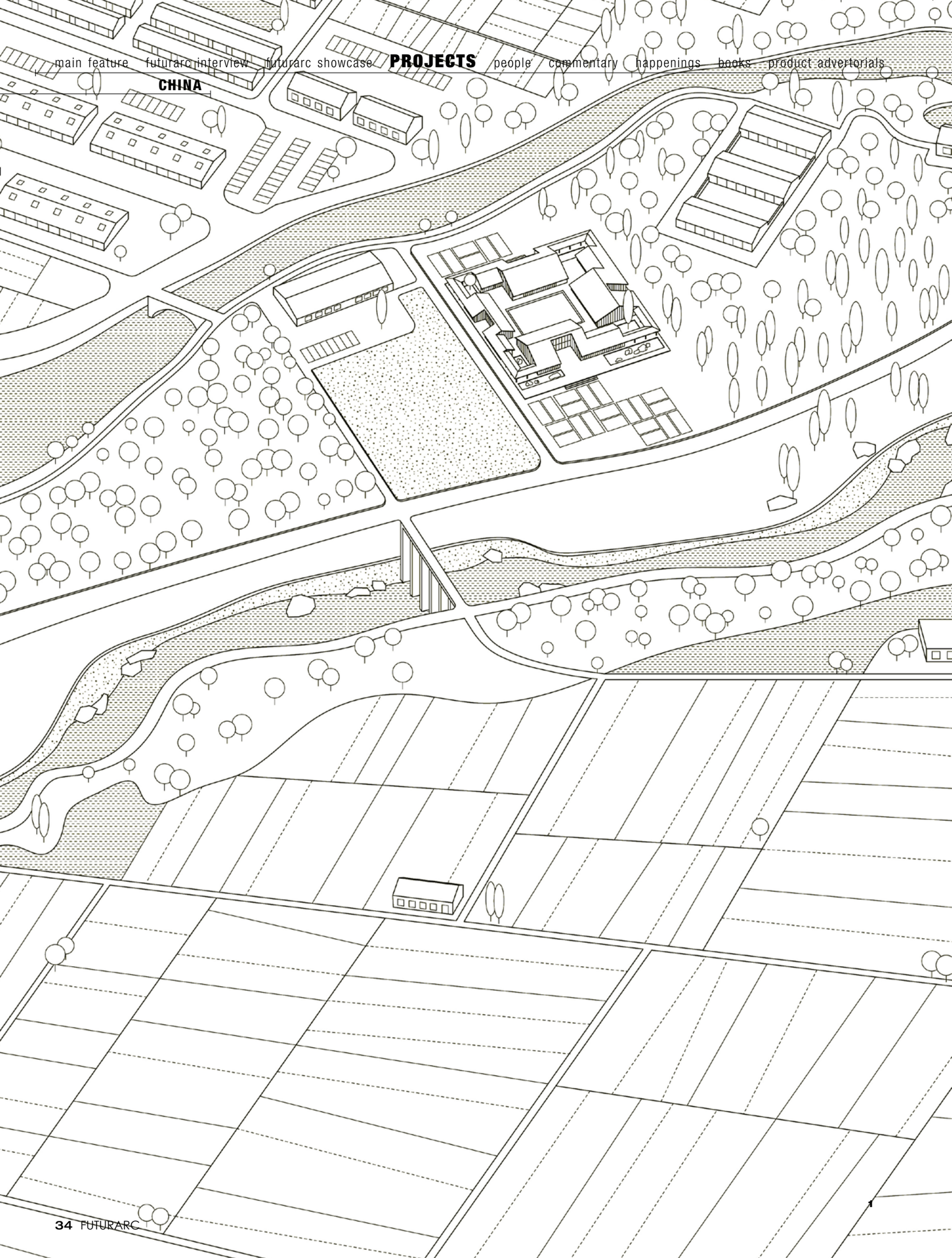
**CHINA**



# TANGSHAN ORGANIC FARM

The project is a processing workshop for organic food. Raw materials that come from organic food producing areas across the country are collected, processed and packed here, and the finished products are then distributed to other places.

Sited on a rectangular flat area covering 6,000 square metres, it is surrounded by villages and farmhouses. The architecture consists of four enclosed, relatively independent houses that are used for storage, milling, oil pressing and packing respectively. Inspired by the traditional courtyard building, which is still the typical model in north China, the idea was to build a 'magnified' courtyard house with multiple courtyard spaces of different sizes—the central courtyard spans out around the blocks randomly, topographically forming myriad layers of yard spaces. There is a strong visual connection between inside and outside, forming a corresponding relationship with the surrounding broad and flat fields. Open exterior verandas and various scales of landscape courtyards also provide people a place to rest and relax. The organic connection of courtyard and house creates functional areas of different sizes under one big roof: small-sized corridors; medium-sized rooms; and large-scaled workshops, to meet the flexible requirements of the compound use of the workshop. The inner courtyard is used to sun grains, and a convenient work cycle line is formed around this space. An external corridor connects the four areas, which also serves as a route for the food processing workshop.

**1** Site plan **2** Exterior view

1

# PIXELET

by **Nitika Agarwal**


Located in Kirti Nagar, a densely populated industrial market in Delhi, the project is a production unit of garments, a single facility that consolidates the manufacturing process of fabrics from raw materials to finished products, exclusively for export. Besides ensuring the inherent quality of fabrics and the finished garments, the clients wanted to establish a healthy, happy and environmentally friendly production of supplies in order to encourage effective productivity.

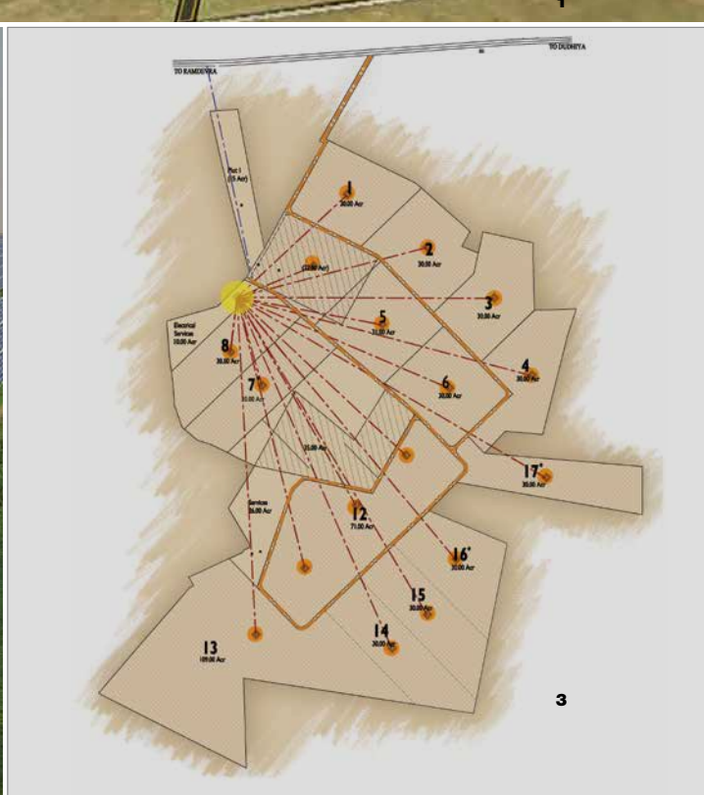
The project borrows from the surrounding landscape; its first appearance from the approach road evokes the geometry and fabric of the neighbouring façades. The elevation facing northwest comprises a rhythmic pattern of vertical planes, staggered at places to create a composition of a three-dimensional surface with glass panes in different shades. The glass is placed at three different levels that filter natural light in varied shades and patterns, reflecting the essence of the surroundings on the inside. The geometry of the façade is originally derived from the structure of a densely populated informal settlement of rag pickers and garbage sorters that lie adjacent to the site, towards the southeast.

**1** Garment showroom **2** Site plan

# RAJASTHAN SOLAR PROCESSING ZONE

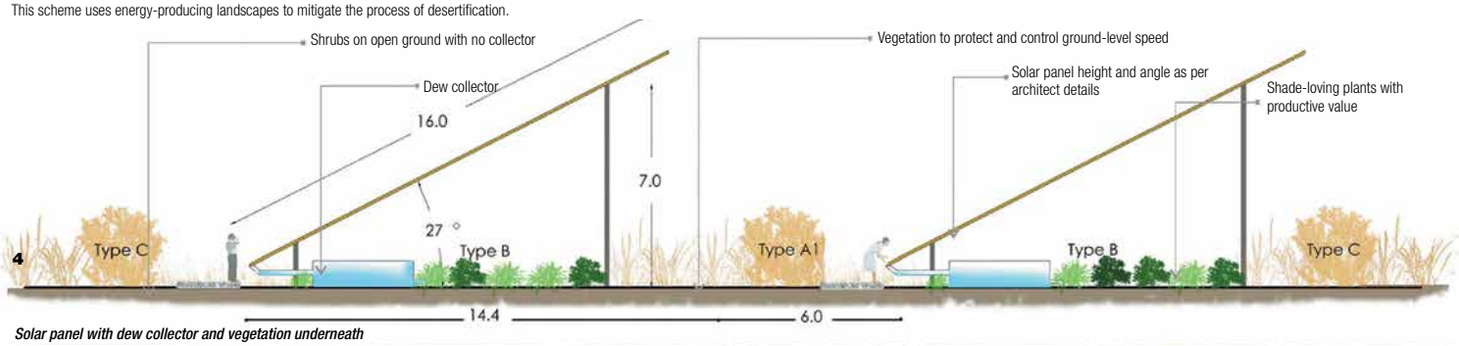
1

2




3

In between two solar panels, the planting comprises small bushes mainly for dust, along with radiation control and pathway, which is used for cleaning of the panels. The water or dew that is used for washing the panels is collected and water-intensive plants are grown below: The planting strategy is based on minimal water requirement of 0.1–0.5 mm/day.
This scheme uses energy-producing landscapes to mitigate the process of desertification.




*Solar panel with dew collector and vegetation underneath*

**Type C: Vegetation to protect from the blowing sand**
1. Crotalaria burhia: with water requirement of 0.3–0.5 mm/day
2. Cenchrus burhia: with water requirement of 0.3–0.5 mm/day
3. Aerva javanica: with water requirement of 0.3–0.5 mm/day

**Type B: To be grown under the collector**
1. Isabgol: with water requirement of 0.2–0.3 mm/day
2. Aloe vera: with water requirement of 0.2–0.3 mm/day

**Type A1: In open ground, with collector, but not directly above**
1. Calligonum polygonoides: with water requirement of 0.3–0.5 mm/day
2. Calotropis procera: with water requirement of 0.3–0.5 mm/day
3. Tramarix troupii: with water requirement of 0.3–0.5 mm/day

An initiative to showcase upcoming technologies in solar power generation, this solar farm is being promoted by a developer using a model of development that brings together multiple investors on one land. The developer is in effect selling serviced plots; providing cleaning, repair and maintenance services; metering and pooling of electricity; its transmission to the state grid; and disbursement of payment from the state grid to the individual plot owners.

There is no storage; the electricity shall be sent to the grid located 23 kilometres away (finally blending with the national grid). The peak potential production is 100 MW, or given a sunny year, 160,000 MWh/year (1,600 hours x 100 MW). In connected load terms, given many houses in India have a 3-kW connection, 100 MW would serve 30,000 houses. Assuming that Indian residents consume about 3 kWh/person per day, this energy would allow 150,000 people to live a net-zero lifestyle, which again translates to about 30,000 homes (or 10 times more if there is a 10-percent blend of renewable energy).

The site plan is based on a number of considerations as follows:

1) The shape of the land that could be acquired by the promoter, which in turn is based on the accidents of history of land ownership in the region.
2) The land that was not to be part of the plots as it was required for some common facilities such as (in order of importance):
   - Roads to reach each plot (with trucks) and street light space
   - Common area containing guesthouse, boreholes for water, research office and station, etc.
   - Common area where electricity could be pooled, transformed and sent ahead to the grid
   - Dust and landscape considerations, which was an unusual touch brought in by landscape architect Mohan Rao from Bangalore
   - Water purification and salt production area (as a by-product of water purification), another unusual touch brought in by hydrology consultant Gopal Krishna Bhat from Gandhinagar

Interestingly, orientation of the panels did not influence the field shapes too much as with such large fields—no matter how the solar collectors are laid out, one will not gain more than 1 or 2 percent at most by optimising on orientation (because the fields are typically 25 acres each and the collector modules are just 2 or 3 metres, so the ends will be jagged or straight but will not affect the total panels that can fit).

The ecology and water aspects are distinctive. Since dust control enhances productivity of panels, ground level vegetation utilising water drips are proposed. In addition, the creation of dust barrier hedges is envisaged. Plants help reduce dust by mulching the sandy soil over a long period of time. Brackish water is available to be pumped from the ground. This is proposed to be used after reverse osmosis (RO) for cleaning the collectors. The dripping water in turn maintains the plants below the collectors. The team experimented and discovered that it would be possible to use the brackish RO effluent water to wash five times and end the wash with clean RO water twice. This leaves a clean layer while using up much of the effluent. This still leaves hyper-concentrated effluents that can be put in a constructed marsh to form a salt pan and produce salt as a by-product. The team has matched the amount of water drawn to the meagre rainfall available, though the water balance will not be positive in drought years.

The various panel owners are expected to invest their money and put in collectors of their choice (the developer can offer the service of selecting a brand at a fee), while the developer takes care of permits; land acquisition; amalgamation; change of land use; sub-division; maintenance; repair; cleaning; upkeep; water; metering; pooling; evacuating to grid, etc., for a price.

The developer gains through land price arbitrage and service fees, and employs local people and firms and trains them for the work. Additionally, the developer gets experience, goodwill, and preferential land and consultation opportunities for future projects. The investors/owners gain by owning a solar farm that generates revenue (today, by spending about US$1 per installed W, one can make 1.6 kWh/year that can fetch about US$0.12 cents per year, or a 12 percent return on investment). The nation gains by getting renewable electricity into the grid through a reliable sunny, desert area at no capital cost to the country and at a competitive operating cost.

**PROJECT DATA**

**Project Name**
Rajasthan Solar Processing Zone
**Location**
Near Ramdevra, Pokaran, Jaisalmer, India
**Status**
Development completed for 100 MW; 50 MW capacity sold
**Expected Completion**
December 2018 for 250 MW capacity; March 2021 for 500 MW capacity
**Site Area**
605 acres currently; 645 acres being added for 250 MW Phase 1 capacity; another 1,250 acres for Phase 2
**Client/Owner**
Shri Shakti Alternative Energy Ltd
**Architecture Firm**
SHiFt
**Principal Architect**
Sanjay Prakash
**Main Contractor**
Civil – Shri Krishna Enterprises
**Civil & Structural Engineer**
Giriraj Kiradoo
**Hydrologist**
G K Bhat (TARU Leading Edge Pvt. Ltd., Gandhinagar, India)
**Environmental designer**
Mohan Rao (Integrated Design, Bangalore, India)
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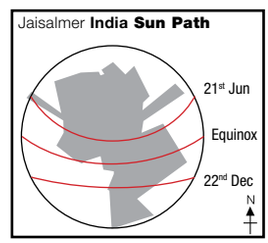



**1** Aerial view **2** Transformer island and PV panels **3** Master plan with electrical evacuation **4** Planting between two panels

# METHOD SOUTH SIDE SOAPBOX

by **Anshuman Roy**


1

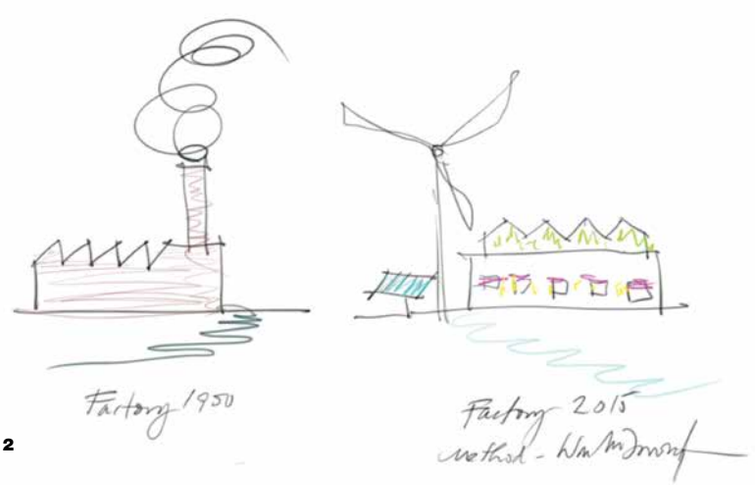
Industrial precincts traditionally conjure images of smokestacks—gritty, hardened buildings spewing effluents and breeding squalor in their wake. The Method Manufacturing Facility in the historic industrial town of Pullman, Chicago represents an effort to break this stereotype and construct a new, clean industrial model. In engaging with a historic community like that of Pullman's—one that has long eschewed principles of progressive planning within an industrial context—this is a project for which engagement with the site and its surroundings would be an imperative, and anything other than a holistic, comprehensive regenerative effort would likely be an imposition.

"With Method's factory, we wanted to become native to an urban community and create an example of what manufacturing can look like in the 21st century," said Adam Lowry, owner of the Method Manufacturing Facility.

Method's production facility, constructed in partnership with William McDonough + Partners, represents the realisation of a dream, as Lowry puts it, that was based on a foundation of values instead of metrics. A large hoarding proclaiming the Method motto "made by and for people against dirty" welcomes visitors into the South Side Soapbox—a witty play on the sustainable soap manufacturer's efforts at staying 'clean'. The state-of-the-art manufacturing home was honoured with a LEED Platinum Certification in 2015 in recognition of its meticulous efforts at achieving comprehensive environmental sustainability.

**1** The factory is a new clean industrial model with a strong visual connection to the outdoors **2** Drawing depicting the clean factory of today in comparison with the dirty, polluting factories of yesterday


*Photo by Patsy McEnroe Photography*




**2**

*Drawing courtesy of William McDonough + Partners*

1

# DEUTSCHE BEKLEIDUNGSWERKE LTD FACTORY LONG HAU

by **Melissa Merryweather**

Long Hau Industrial Park, 40 minutes south of Ho Chi Minh City, is tucked beside a small offshoot of the Saigon River. The surrounding area, a checkerboard of rice paddies, is gearing up to take the spillover from the big city and its nearby industrial neighbours.

Vietnam has witnessed key cases of high-profile environmental damage in the past few years, and there is a new urgency, especially for foreign-invested factories, to adhere to anti-pollution laws. Deutsche Bekleidungswerke (DBW), wholly owned by Hong Kong-based Royal Spirit Group, has an existing client base including premier fashion labels with strong environmental credentials. Consequently, for the new factory in Vietnam, they elected to go far beyond basic compliance and demonstrate environmental leadership, choosing to dual-certify at the highest level with Platinum LEED and LOTUS. DBW took a strong stance from the outset on worker comfort and health. They set sustainability goals to maximise benefits to occupants, in addition to benefitting the bottom line.

**1** From the outset, DBW took a strong stance on workers' comfort and health

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# Green Awards

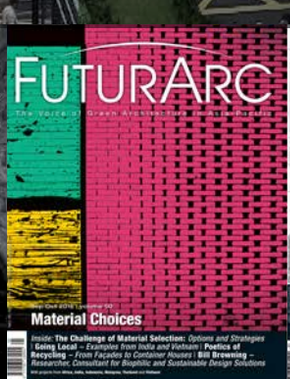
Coming up next—our most awaited Green Awards issue!

Look out for the winning entries from FuturArc Prize 2017, and a showcase of other Asia-Pacific projects with strong Green design concepts and initiatives.

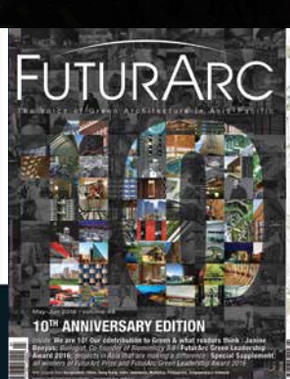
If you have projects to nominate, please send an email with a brief profile and photos to c.lim@futurarc.com by end March 2017.

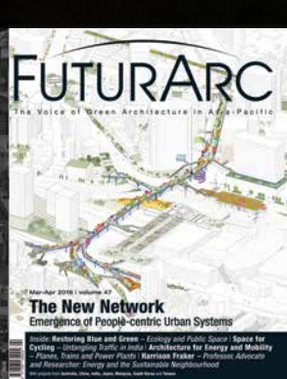
We will notify you if your project is shortlisted for publication. Please note that the selection of projects is subject to editorial discretion.







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| Philippines | PHP 3,000 | PHP 1,200 |
| Singapore | SGD 90 | SGD 36 |
| Thailand | THB 1,740 | THB 696 |
| Vietnam | VND 1,140,000 | VND 456,000 |

## SUBSCRIPTION DETAILS

Name

University/Tertiary Institution

Address

Telephone Fax

Email

Student ID

(Please show proof of student ID when submitting form.)

## PAYMENT METHOD

☐ **Credit Card**

☐ *Visa* ☐ *Mastercard*

☐ For payment by Telegraphic Transfer, Cheque or Cash
Please contact your local BCI office.

Card Number

Security Number Amount

Name on Card

Expiry Date

Telephone Country

*This promotion is only valid for subscribers in Hong Kong, Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam.*

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