BURO HAPPOLD

GAME OF ZONES
TEACHING TOOL FOR INDUSTRIAL PARKS & INVESTMENT ZONES


# GREEN INDUSTRIAL DISTRICTS

HANDBOOK FOR TRAINING PARTICIPANTS

JUNE 2021

CLIENT

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# INTRODUCTION

Industrial Parks are in a constant global competition for creating products that are financially and socially sound. The latter can be achieved by providing attractive investment and working environments and often go hand in hand with an approach towards 'Green Industrial Parks'. While those efforts are widely received as being cost intensive reality often proves that the most successful greening measures are those that are not the most expensive or technologically advanced but those that are low-tech and behaviour changing.

The Training Tool and Games should provide you with a comprehensive, inspirational and yet easily approachable access to create, maintain and upgrade Green Industrial Parks in India. The Training Tool captures many of the strings that once combined create a Green Industrial Park. It is understood as a working tool that should constantly be inspired by the training facilitators, participants and implemented projects alike.

While its intend is to provide the participant with applicable strategies and components for a direct application on Green Industrial Districts there is no given target for the 'Greenness' of an Industrial Park. In fact combining all of the content that will be presented does not create the greenest Industrial Park, but combining a few but right individual approaches can already have a huge impact on even existing Industrial Parks.

The aim is to learn about what is out there and what measures should be preferred leading towards invaluable synergies that often define the real 'Greenness' of an Industrial Park.

In a playful manner often complex topics are pragmatically unleashed to make them accessible to beginners and subject-matter experts alike.

The setup of various levels let the participants join in at their respective level of knowledge and allow for dynamic and interactive sessions – with the participants being an integral component for the overall success of the training. The spice is brought in by the individual learning experience with unique results at the end of each training session. The games will lead to uncountable and always new combinations of individual measures to deliver greener Industrial Parks.

It is however to mention that despite of the tools providing participants with applicable knowledge it is highly recommended to involve an Urban Planner or Architect, etc. before implementing individual measures – to make sure that it is the right measure at the right time, the right location, and that it creates the maximum of synergies. We know that resources are not endless and thus not only want to avoid spending your money on goodwill but at the wrong components.

We hope that the Training Tool and Games will inform the design/redesign and implementation of Green Industrial Parks in India and beyond.

We are looking forward to your success stories making Green Industrial Parks a reality!

Kind regards,

Thomas Kraubitz
Project Director Buro Happold

Stephan Anders
Project Director DGNB

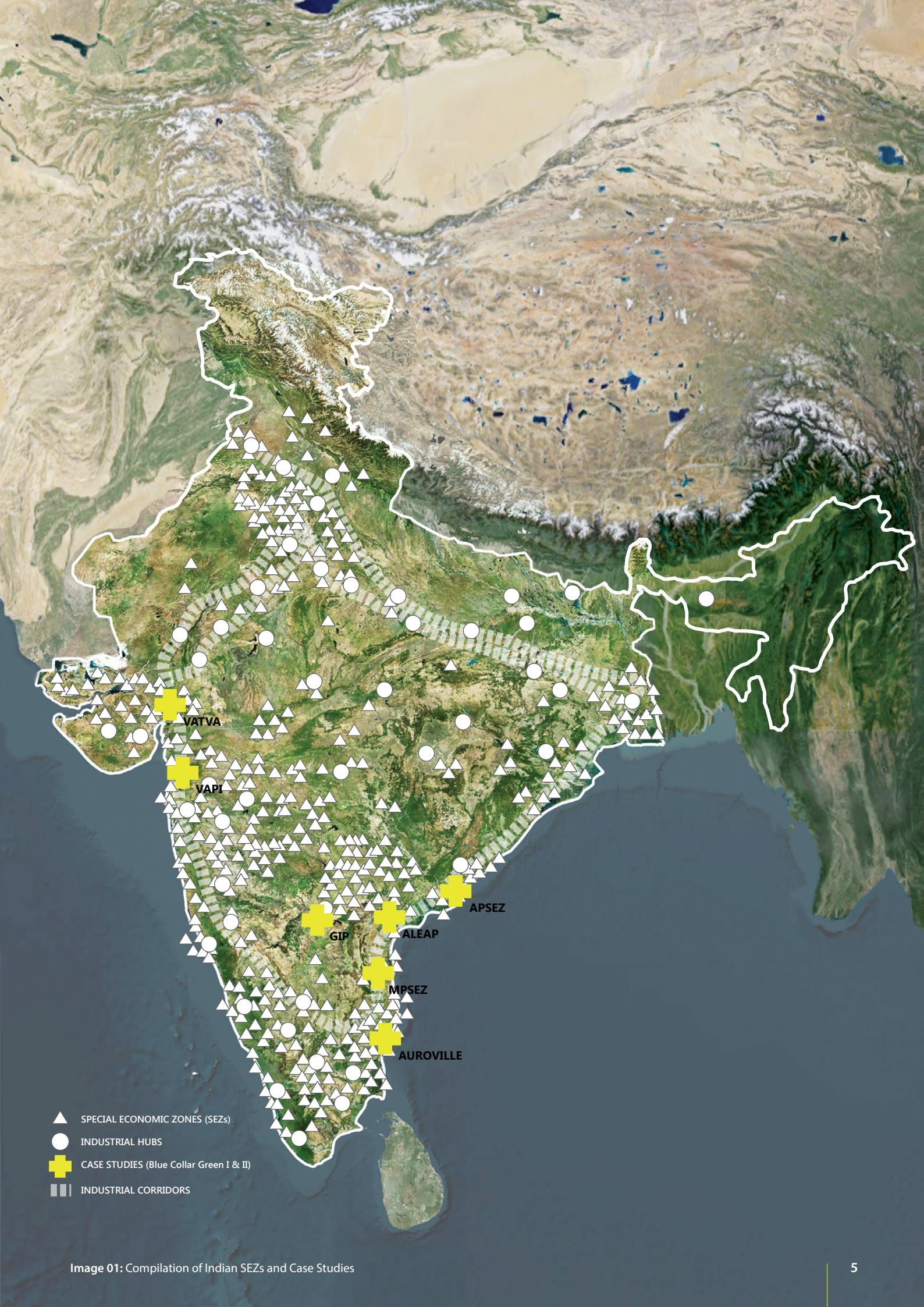


**Image 01:** Compilation of Indian SEZs and Case Studies

# OBJECTIVES

# OBJECTIVES AND PURPOSE OF THE TRAINING

India's economy is expanding rapidly. The government aims to grow its workforce up to 270 million workers by 2030. Hence it can be expected that the country in the next decades will face a critical challenge: managing industrial growth in a way that also enhances the liveability of the Industrial Parks and the communities their workers can reside in.

Under the Indo German Environment Partnership (IGEP) Programme of the Indo German Bilateral Development Cooperation the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is providing technical cooperation in India to selected partners on identified core topics.

Under IGEP, one of the core topics is "Planning of Industrial Parks". Pilot activities were undertaken for preparation of site master plans of Industrial Parks and Special Economic Zones (SEZs) in the States of Andhra Pradesh and Telangana. Also, several 2 to 3 day training programmes were conducted for participants from public and private agencies on basic principles of site master planning.

Considering the high industrial growth targets of India, the envisioned development of Industrial Parks, Industrial Investment Zones and Industrial Corridors, and the newly launched "Make in India" programme, it is pertinent to build capacities of public and private agencies for undertaking systematic site master planning of the industrial areas integrating environmental, climate change and resource efficiency aspects.

Capacity building should be achieved through training measures with stakeholders from public and private agencies that are involved in preparing and executing site master plans of industrial areas.

More specifically the objectives of the trainings are:

- Raise awareness on the principles of sustainable development and to introduce the participants to them
- Gaining knowledge on the main sustainability themes and subsequent technologies and planning approaches in an interactive and playful way
- Development of skills that will enable the target groups to apply sustainability approaches into their daily work in the planning and construction industry
- Eventually developing a standardised certification course

**Although the training does include elements on how to apply certain technologies and/or planning approach to specific sites ('Design your Industrial District'), it is however very important to note, that this training and the material provided will not equip the participants with the required knowledge and skills to plan an Industrial District.**

**Hence this training does not replace professional (accredited) education in the relevant fields, e.g. architecture, planning or civil engineering but will equip professionals with knowledge and awareness on these topics to include in sustainable industrial districts.**

The following chapter will provide the reader with background knowledge and understanding on current challenges and solutions for industrial areas in India.

All information in this chapter stems from the report 'Blue Collar Green II' authored by BuroHappold on behalf of the GIZ in 2014/2015.

**Image 02:** Test Trainings in Delhi, July 2015

# DGNB BLOG ON THE DEVELOPMENT OF THE GAME OF ZONES

We have been asked for an interview on the Development of the Teaching Tool and Game to be featured on the DGNB Blog:

http://blog.dgnb.de/spiel-fuer-indien/

It should serve as an introduction to the topic and set the stage for the chapters to follow. A translation of the interview to follow below.

**Felix Jansen (Q):** Commissioned by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) BuroHappold developed something very special for the Indian market: A learning game based on the German Sustainable Building Council (DGNB) rating system for industrial sites. How exactly do you want to use it and what do you expect?

**Thomas Kraubitz (TK):** Over the last three years, we helped the GIZ in India to develop national standards for sustainable industrial areas. In this context, we were able to offer several training sessions and also to learn a lot about the local situation in situ. To convey the principles of planning, operating and revitalising an Industrial District in an attractive and participatory manner, we developed a game for use in India. Graphically, through text and rough cost-benefit comparisons, the players can learn about how different criteria interact and contribute to the development of holistic sustainable planning concepts. With local partners, the game can be played even in more remote areas of India, in order to also enable improvements in the industrial sites in the periphery.

**Q:** How did you proceed in order to translate criteria of the DGNB system in a playable and didactically meaningful form that works for the Indian market?

**TK:** At first we freed ourselves from certification systems and the aim of getting a plaque at the end of the process. Many of the industrial areas are in such a bad condition that we already can achieve tremendous improvements with the introduction of a few smart components. We also wanted to introduce appropriate methods and strategies for the Indian market, in which low-tech components are often preferred instead of high-tech ones with extensive maintenance costs. Inspired from our training during the last years, we also included a wide range of topics that are not necessary part of the DGNB system, including economic and social justice topics, such as the national ban on child labour. Some of the 270 playing cards are based on simplified DGNB criteria, many components, however, are entirely new and incorporated into the game. Perhaps these criteria will flow into the next system update for DGNB Industrial Sites. The goal was to include many different sustainable planning mechanisms, which address the environmental, social and economic aspects of sustainability and which offer opportunities for innovation in business and manufacturing.

**Q:** How much work did you put into the game? How long was the development time?

**TK:** Of course government funded projects have limited financial resources, but since we have project experience in the field of industrial production in Germany and abroad as well as a dedicated team, it was possible to develop a balanced and exciting training tool and games in only a few months – and designing it was great fun. The concept of the mediation of complex engineering knowledge via playing cards may also be helpful to other projects, especially in the preliminary design stage: Raising the right questions, making connections and exploiting synergies. Development aid is not an area for large profits, but knowledge transfer is very meaningful and satisfying.

**Q:** Even before Chinese cities, Indian cities are clearly among those with the highest air pollution worldwide. Against this background: How open minded are the state institutions and investors in India about sustainable building? Or are the social issues so extraordinary that one tends to not care?

**TK:** I lived in China and Southeast Asia for several years and witnessed the pollution of cities first hand, but the impact of industrial production and its ecological damage is unprecedented in India today. Especially the many small and micro-operations contribute enormously to environmental pollution, often due to ignorance. This is where our game comes in: by showing sustainable planning mechanisms with synergies that are feasible even with limited financial possibilities. Thanks to the government's new 'Make in India' programme, the development especially of individual sustainable design and planning skills of industrial workers and their managers will be encouraged. An annual growth in industrial production of 12 to 14 percent by 2022 will cause a demand of 100 million jobs in the industrial production sector, so manufacturing is likely to make a continued large impact – something which we hope the game can address. Prior to now, Industrial Parks have been largely planned without consideration of sustainability aspects, but little by little the economic benefits of sustainable industrial areas are being recognised. Through using fewer resources these areas generate higher profits – and this is precisely how you get the attention of decision makers in the industry.

**Q:** As a DGNB auditor you know the DGNB system in every detail – in theory and practice. By developing and playing the game did you still learn something new about working with the DGNB system?

**TK:** The DGNB system for Industrial Sites can also be applied internationally. While preparing the training and input to the National Guidebook for Industrial Sites in India, we analysed a wide variety of methods and protocols for 'Green Industrial Areas'. As part of preliminary investigations, the so-called 'DGNB Quick Checks', we reviewed seven industrial areas of India that provided us with important information about the system adaptation in the Indian context. Beyond the typical DGNB criteria, other basic areas must be considered, such as a ban on child labour, elementary health and safety measures and security. We were also delighted by the many innovative approaches to the creation of leisure and recreational facilities within the industrial sites. In the context of sustainable site development, the DGNB system is not only a good tool for rich industrialized countries, but can also make an important contribution to quality assurance of German companies abroad and in international development cooperations.

**Q:** How is the game played?

**TK:** We chose to create several different methods of play, to appeal to different audiences with varied levels of exposure to Industrial District Planning. So, players could include planners, manufacturing owners or investors, or even business or design students. The game is a mixture of concentration and a card game. In the beginning the players (3-12) get a certain number of playing cards of different categories. Then they have to collect more cards with other synergies, in order to create a first approach to an overall concept. The cards can be traded with other players. At the end the most convincing concept wins. The learning effect results from both developing your own concept and watching other players developing theirs. At the very end two players develop an overall concept from their individual ones and present it together. We have invested a lot of experience and work in the game development and are delighted with the success the game has so far.

**Q:** How much work did you put into the game? How long was the development time?

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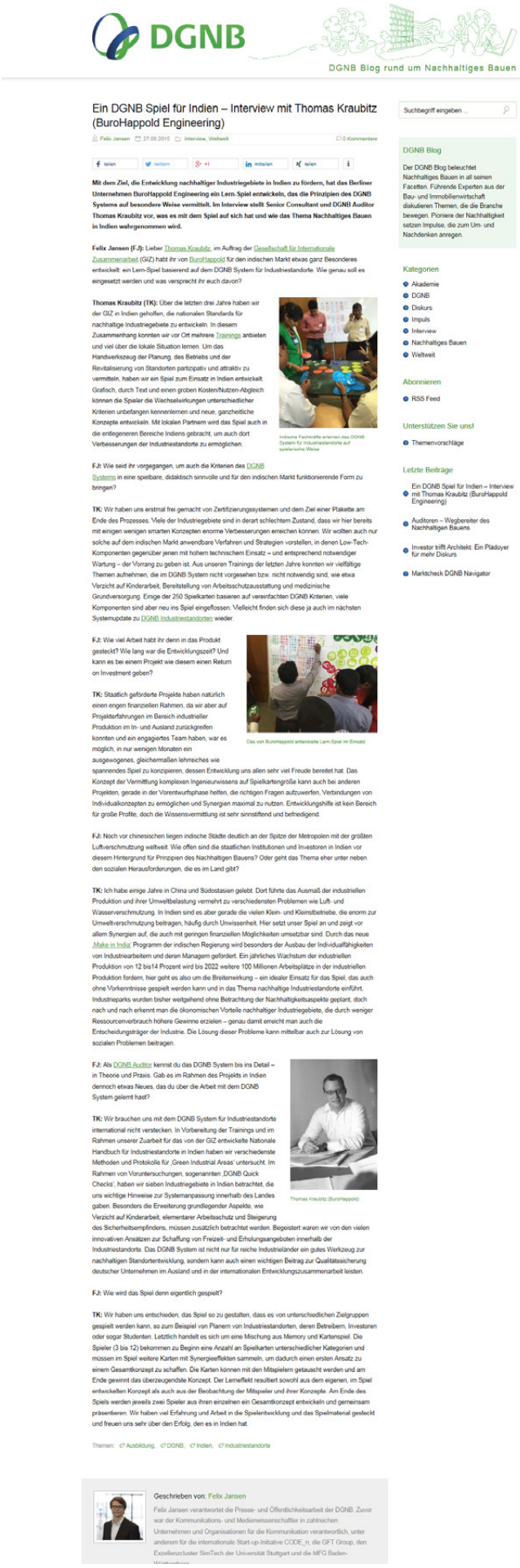
DGNB

DGNB Blog rund um Nachhaltiges Bauen

Ein DGNB Spiel für Indien – Interview mit Thomas Kraubitz (BuroHappold Engineering)

Felix Jansen 27.08.2015 Interview, Weltweit 0 Kommentare

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**Mit dem Ziel, die Entwicklung nachhaltiger Industriegebiete in Indien zu fördern, hat das Berliner Unternehmen BuroHappold Engineering ein Lern-Spiel entwickeln, das die Prinzipien des DGNB Systems auf besondere Weise vermittelt. Im Interview stellt Senior Consultant und DGNB Auditor Thomas Kraubitz vor, was es mit dem Spiel auf sich hat und wie das Thema Nachhaltiges Bauen in Indien wahrgenommen wird.**

**Felix Jansen (F.J):** Lieber Thomas Kraubitz, im Auftrag der Gesellschaft für Internationale Zusammenarbeit (GIZ) habt ihr von BuroHappold für den indischen Markt etwas ganz Besonderes entwickelt: ein Lern-Spiel basierend auf dem DGNB System für Industriestandorte. Wie genau soll es eingesetzt werden und was versprecht ihr euch davon?

**Thomas Kraubitz (TK):** Über die letzten drei Jahre haben wir der GIZ in Indien geholfen, die nationalen Standards für nachhaltige Industriegebiete zu entwickeln. In diesem Zusammenhang konnten wir vor Ort mehrere Trainings anbieten und viel über die lokale Situation lernen. Um das Handwerkszeug der Planung, des Betriebs und der Revitalisierung von Standorten partizipativ und attraktiv zu vermitteln, haben wir ein Spiel zum Einsatz in Indien entwickelt. Grafisch, durch Text und einen groben Kosten/Nutzen-Abgleich können die Spieler die Wechselwirkungen unterschiedlicher Kriterien unbefangen kennenlernen und neue, ganzheitliche Konzepte entwickeln. Mit lokalen Partnern wird das Spiel auch in die entlegeneren Bereiche Indiens gebracht, um auch dort Verbesserungen der Industriestandorte zu ermöglichen.


Indische Fachkräfte erlernen das DGNB System für Industriestandorte auf spielerische Weise

**F.J:** Wie seid ihr vorgegangen, um auch die Kriterien des DGNB Systems in eine spielbare, didaktisch sinnvolle und für den indischen Markt funktionierende Form zu bringen?

**TK:** Wir haben uns erstmal frei gemacht von Zertifizierungssystemen und dem Ziel einer Plakette am Ende des Prozesses. Viele der Industriegebiete sind in derart schlechtem Zustand, dass wir hier bereits mit einigen wenigen smarten Konzepten enorme Verbesserungen erreichen können. Wir wollten auch nur solche auf dem indischen Markt anwendbare Verfahren und Strategien vorstellen, in denen Low-Tech-Komponenten gegenüber jenen mit hohem technischem Einsatz – und entsprechend notwendiger Wartung – der Vorrang zu geben ist. Aus unseren Trainings der letzten Jahre konnten wir vielfältige Themen aufnehmen, die im DGNB System nicht vorgesehen bzw. nicht notwendig sind, wie etwa Verzicht auf Kinderarbeit, Bereitstellung von Arbeitsschutzausstattung und medizinische Grundversorgung. Einige der 250 Spielkarten basieren auf vereinfachten DGNB Kriterien, viele Komponenten sind aber neu ins Spiel eingeflossen. Vielleicht finden sich diese ja auch im nächsten Systemupdate zu DGNB Industriestandorten wieder.

**F.J:** Wie viel Arbeit habt ihr denn in das Produkt gesteckt? Wie lang war die Entwicklungszeit? Und kann es bei einem Projekt wie diesem einen Return on Investment geben?


Das von BuroHappold entwickelte Lern-Spiel im Einsatz

**TK:** Staatlich geförderte Projekte haben natürlich einen engen finanziellen Rahmen, da wir aber auf Projekterfahrungen im Bereich industrieller Produktion im In- und Ausland zurückgreifen konnten und ein engagiertes Team haben, war es möglich, in nur wenigen Monaten ein ausgewogenes, gleichermaßen lehrreiches wie spannendes Spiel zu konzipieren, dessen Entwicklung uns allen sehr viel Freude bereitet hat. Das Konzept der Vermittlung komplexen Ingenieurwissens auf Spielkartengröße kann auch bei anderen Projekten, gerade in der Vorentwurfsphase helfen, die richtigen Fragen aufzuwerfen, Verbindungen von Individualkonzepten zu ermöglichen und Synergien maximal zu nutzen. Entwicklungshilfe ist kein Bereich für große Profite, doch die Wissensvermittlung ist sehr sinnstiftend und befriedigend.

**F.J:** Noch vor chinesischen liegen indische Städte deutlich an der Spitze der Metropolen mit der größten Luftverschmutzung weltweit. Wie offen sind die staatlichen Institutionen und Investoren in Indien vor diesem Hintergrund für Prinzipien des Nachhaltigen Bauens? Oder geht das Thema eher unter neben den sozialen Herausforderungen, die es im Land gibt?

**TK:** Ich habe einige Jahre in China und Südostasien gelebt. Dort führte das Ausmaß der industriellen Produktion und ihrer Umweltbelastung vermehrt zu verschiedensten Problemen wie Luft- und Wasserverschmutzung. In Indien sind es aber gerade die vielen Klein- und Kleinstbetriebe, die enorm zur Umweltverschmutzung beitragen, häufig durch Unwissenheit. Hier setzt unser Spiel an und zeigt vor allem Synergien auf, die auch mit geringen finanziellen Möglichkeiten umsetzbar sind. Durch das neue ‚Make in India' Programm der indischen Regierung wird besonders der Ausbau der Individualfähigkeiten von Industriearbeitern und deren Managern gefördert. Ein jährliches Wachstum der industriellen Produktion von 12 bis14 Prozent wird bis 2022 weitere 100 Millionen Arbeitsplätze in der industriellen Produktion fordern, hier geht es also um die Breitenwirkung – ein idealer Einsatz für das Spiel, das auch ohne Vorkenntnisse gespielt werden kann und in das Thema nachhaltige Industriestandorte einführt. Industrieparks wurden bisher weitgehend ohne Betrachtung der Nachhaltigkeitsaspekte geplant, doch nach und nach erkennt man die ökonomischen Vorteile nachhaltiger Industriegebiete, die durch weniger Ressourcenverbrauch höhere Gewinne erzielen – genau damit erreicht man auch die Entscheidungsträger der Industrie. Die Lösung dieser Probleme kann mittelbar auch zur Lösung von sozialen Problemen beitragen.

**F.J:** Als DGNB Auditor kennst du das DGNB System bis ins Detail – in Theorie und Praxis. Gab es im Rahmen des Projekts in Indien dennoch etwas Neues, das du über die Arbeit mit dem DGNB System gelernt hast?


Thomas Kraubitz (BuroHappold)

**TK:** Wir brauchen uns mit dem DGNB System für Industriestandorte international nicht verstecken. In Vorbereitung der Trainings und im Rahmen unserer Zuarbeit für das von der GIZ entwickelte Nationale Handbuch für Industriestandorte in Indien haben wir verschiedenste Methoden und Protokolle für ‚Green Industrial Areas' untersucht. Im Rahmen von Voruntersuchungen, sogenannten ‚DGNB Quick Checks', haben wir sieben Industriegebiete in Indien betrachtet, die uns wichtige Hinweise zur Systemanpassung innerhalb des Landes gaben. Besonders die Erweiterung grundlegender Aspekte, wie Verzicht auf Kinderarbeit, elementarer Arbeitsschutz und Steigerung des Sicherheitsempfindens, müssen zusätzlich betrachtet werden. Begeistert waren wir von den vielen innovativen Ansätzen zur Schaffung von Freizeit- und Erholungsangeboten innerhalb der Industriestandorte. Das DGNB System ist nicht nur für reiche Industrieländer ein gutes Werkzeug zur nachhaltigen Standortentwicklung, sondern kann auch einen wichtigen Beitrag zur Qualitätssicherung deutscher Unternehmen im Ausland und in der internationalen Entwicklungszusammenarbeit leisten.

**F.J:** Wie wird das Spiel denn eigentlich gespielt?

**TK:** Wir haben uns entschieden, das Spiel so zu gestalten, dass es von unterschiedlichen Zielgruppen gespielt werden kann, so zum Beispiel von Planern von Industriestandorten, deren Betreibern, Investoren oder sogar Studenten. Letztlich handelt es sich um eine Mischung aus Memory und Kartenspiel. Die Spieler (3 bis 12) bekommen zu Beginn eine Anzahl an Spielkarten unterschiedlicher Kategorien und müssen im Spiel weitere Karten mit Synergieeffekten sammeln, um dadurch einen ersten Ansatz zu einem Gesamtkonzept zu schaffen. Die Karten können mit den Mitspielern getauscht werden und am Ende gewinnt das überzeugendste Konzept. Der Lerneffekt resultiert sowohl aus dem eigenen, im Spiel entwickelten Konzept als auch aus der Beobachtung der Mitspieler und ihrer Konzepte. Am Ende des Spiels werden jeweils zwei Spieler aus ihren einzelnen ein Gesamtkonzept entwickeln und gemeinsam präsentieren. Wir haben viel Erfahrung und Arbeit in die Spielentwicklung und das Spielmaterial gesteckt und freuen uns sehr über den Erfolg, den es in Indien hat.

Themen: Ausbildung, DGNB, Indien, Industriestandorte

Suchbegriff eingeben ...

DGNB Blog

Der DGNB Blog beleuchtet Nachhaltiges Bauen in all seinen Facetten. Führende Experten aus der Bau- und Immobilienwirtschaft diskutieren Themen, die die Branche bewegen. Pioniere der Nachhaltigkeit setzen Impulse, die zum Um- und Nachdenken anregen.

Kategorien

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Letzte Beiträge

- Ein DGNB Spiel für Indien – Interview mit Thomas Kraubitz (BuroHappold Engineering)
- Auditoren – Wegbereiter des Nachhaltigen Bauens
- Investor trifft Architekt: Ein Plädoyer für mehr Diskurs
- Marktcheck DGNB Navigator



Geschrieben von: Felix Jansen

Felix Jansen verantwortet die Presse- und Öffentlichkeitsarbeit der DGNB. Zuvor war der Kommunikations- und Medienwissenschaftler in zahlreichen Unternehmen und Organisationen für die Kommunikation verantwortlich, unter anderem für die internationale Start-up-Initiative CODE_n, die GFT Group, den Exzellenzcluster SimTech der Universität Stuttgart und die MFG Baden-

**Image 03:** DGNB Blog on the Game, August 27th 2015

EXECUTIVE SUMMARY
BLUE COLLAR GREEN I & II

# BLUE COLLAR GREEN

# GREEN INDUSTRIAL DISTRICTS, KEY TO A GLOBALIZED MARKET

In our globalized world, industrial products no longer have to serve local markets but the global need. With a steadily increasing demand of the end user in the origin and environmental performance of a product the costs are no longer the sole reason for purchase.

The public and consumer interest in the way goods are manufactured puts workers and their wellbeing into focus.

With natural and manmade disasters, like the Bhopal accident 30 years ago, can lead to a downfall not only of an industrial estate but a whole community.

To succeed, Industrial Districts need a framework tackling economical, ecological & sociocultural components, creative leadership, engaged Industrial Associations and a collective commitment towards green Industrial Districts.

# THE MOST SUCCESSFUL GREEN INDUSTRIAL DISTRICTS ARE THOSE THAT ...

are connected to liveable communities that see the Industrial District as a vital component

have high accessibility connecting land use and public transportation

make full use of the SEZ potential and connections to Industrial Corridors

invest in human capital and economic development, attracting talent and providing high employment opportunities for residents

limit the environmental impact, especially on the scarce water resources

show a strong identity and be well positioned internationally

maximise CSR efforts and collectively use them for greening strategies

have access to steady power supply with low CO2 emissions

The success of Indian Green Industrial Districts depends on their transparency and concerted efforts to interact with those they serve:

Industry owners, businesses, workers, safety and the broader community interests.

## THE ROLE OF INDIAN GREEN INDUSTRIAL DISTRICTS

**DELIVERING AND GUIDING INDUSTRIAL STRATEGIES AND PLANS**

**INTEGRATION OF ENVIRONMENTAL PROTECTION AND ITS MONITORING**

**PROVIDING SAFE AND FAIR WORKING ENVIRONMENTS**

**ENSURING HIGH QUALITY OF PRODUCT AND LIFE**

**Image 04:** Main Road GIP Jadcherla, October 2013

# KEY FINDINGS

REVIEWING THE DIVERSE INDUSTRIAL DISTRICTS ALLOWED US TO COMBINE OUR OBSERVATIONS AND FINDINGS INTO A GENERAL RECOMMENDATION APPLICABLE FOR ALL ESTATES.

Implementing best practice and international standards from anchor industries, like Bayer Pharmaceuticals, etc. might attract local companies and better the market position of products made in Indian Green Industrial Parks.

## ECONOMICS ₹

A strong economic potential lies in the long term interest of key stakeholders. Be it the industrial organisations of the existing Districts or the APIIC / TSIIC for the new Industrial Districts, they are all in for the long run and show a big interest in the operation and maintenance costs over a 50 year period – the biggest financial burden the districts and their management has to bear.

Some of the Industrial Districts, like GIP, include Special Economic Zones (SEZ) with others like MPSEZ and APSEZ being fully dedicated SEZs. Combining the benefits of an SEZ, an increasingly common phenomenon in Indian Industrial Districts, with the advantages of Green Industrial Districts will allow them to become top of class and to market themselves internationally.

On taxation it appears that 65% of the property taxes will remain in the Industrial Park whereas 35% are given to the local government. All other applicable taxes seem to completely go to the central government of India. Outlaying the bundled financial strength of an Industrial District to the government might bring additional federal funding, tax benefits and political momentum that can support the aspirations towards Green Industrial Districts.

The costs for electricity are higher for industries than they are for private costumers – something fundamentally different to Europe or the US – and thus especially measures monitoring and saving electricity should be included to protect the environment and to allow producing goods at lower operational costs.

Another source to fund additional sociocultural aspects can be seen in the mandatory CSR (Corporate Social Responsibility) funds. In India the CSR Act seems to ask for 2% of the profit to be put into social projects/measures. Using CSR money across the Industrial Locations in a collective manner – in some cases there are over 1000 enterprises within the park – a significant project might use those sources wisely and for the overall good of the park and its neighbors.

The German KfW promotional bank, supporting change and encouraging forward looking ideas, has allocated money for industrial projects in Andhra Pradesh but not specifically assigned it towards any particular Industrial Park. Further discussions between the GIZ and the KfW might help to secure some funding to support aspects of the Green Industrial Parks.

Creating opportunities for micro businesses, like street vendors, should be encouraged but also monitored to make sure that minimum standards on Health and Safety are achieved. Informal street vendors pose health risks for the employee – the most valuable resource of any industrial operation. Thus any business dealing with food should be trained on hygiene and ideally be monitored regularly.

All Industrial Parks aim for a signature entrance and combined with a communal use those could become useful elements for the district and community alike. On MPSEZ the water tower on the inner district hillock could be used as a signage for the Industrial Park. ALEAP has started a competition for local architecture students on a central clock tower to support the nearby village community.

The Indian Green Building Council has phased out LEED projects under the USGBC protocol. With the Indian rating system being better adjusted to the country than the international LEED version, it however lost its international comparability – something the DGNB protocol could bring back with a system that is adjusted to the local context. The Pre-Assessments of the different projects indicate that a certification under the DGNB Industrial Districts is in reach for all parks, ranging from Silver to a tight Platinum level.

A value engineering and cost cutting exercise has helped the GIP team to prioritize areas that are not essential for a Green Industrial District but that can reduce the overall costs making green not necessarily more expensive but smarter by using the resources available best.

Wherever close to a railway corridor options for connecting the Green Industrial Park with freight railway should be evaluated for its potential cost benefits and emissions reductions.

## ENERGY

Power shortages are currently experienced in all of the analysed Industrial Parks but said to be solved within the next three years. In its extreme it results in only having 5 out of 7 days a week for production and it thus imposes a great financial loss to the industries and society. The projects visited and analysed are all designed to be based on the federal electricity net. While all Industrial Parks are served by the federal source of power, GIP profits from having hydropower as the closest energy source bringing seemingly green electricity to the district. All other reviewed Industrial Parks have coal power plants as the closest source.

Only on MPSEZ a power plant will be built on the premise of the SEZ and is said to allow for a power shortage free operation where the heat could be used for on-site steam production, cooling (however with great losses) or desalination.

Natural gas is not widely used in India, because of the high unit costs, but researching the options for gas connections (following the government's intentions on a better gas network and supply) might pose a viable and lucrative alternative towards the federal grid system mainly fueled by coal power. Contracting options could be imagined and a gas based power supply would instantly solve the loss of 2/7 of production capacity. Such a system could be done only in full operation, for times of power shortages only or in a mixed mode.

In general power lines seem always to be planned above ground rendering directly adjacent areas as unsuitable for development and are often too close to residential buildings and might trigger health issues. Power substations within Industrial Districts are often strategically located but seem not to have been placed considering the minimum length of cables, etc. and inherit a potential to save additional hard costs by strategic allocation.

On-site energy production by photovoltaics can be a viable option. Currently subsidies of 30% from federal and 20% from the state government seem not to be attractive enough for industries to implement at a larger scale. For several parks it has been discussed but so far only ALEAP is considering it to a larger extent. On a smaller scale APIIC has already installed solar street lamps on pilot projects at Nacharam, Mallapur and Moula Ali.

## WATER

Groundwater and its scarcity is an overarching topic for Industrial Parks and India with a call for an integrated water resource management that considers all sources of water, its quantity as well as quality. It also appears that potable water is not been paid for but rather is one component within the overall utility fees industries pay. So far there has not been much interest in water metering for the overall districts, nor a consumption based measurement and costing for the individual industries. Especially for GIP Jadcherla insufficient groundwater is constantly extracted for the Industries and forms an operational risk to the park and the surrounding settlements. Despite an increasing awareness of water scarcity there is no solution yet. Rainwater is generally not harvested but used to recharge the groundwater level. Extractions happen over 12 months of time and groundwater recharge only during three months of the year with significant rainwater (June to September). Only for ALEAP rainwater cisterns are planned, all other projects do consider rainwater management in form of existing or new rainwater ponds and swales but do not anticipate building up rainwater storage capacity. All projects have their own waste water treatment facility and the cleaned non potable water is used for agriculture or non-processing purposes within the district.

# GREEN INDUSTRIAL PARKS - SHADES OF GREEN


## APSEZ (2,300 HA)

### ANDHRA PRADESH SPECIAL ECONOMIC ZONE AT VISAKHAPATNAM

APSEZ has unique chances routed in solid planning for a large variety of industries and a large scale onsite power generation to serve the district and beyond.

With the district being a full SEZ synergies like proper industrial layout, material reuse, waste stream optimization, etc. could be used to the fullest.

A 500 MW power facility to be built within the SEZ will make the Industrial District independent to power shortages and can allow a 24/7 operation. If rehab housing is included in the overall planning it could provide affordable housing for APSEZ workers.

Existing water bodies are not touched upon and some industries are already implementing measures to use non potable sources in its production. Providing that the baseline for a certification is met the project has undergone a DGNB Pre-Assessment, involving the design team, resulting at a total of **62,5%** - a solid **Silver** level.

## GIP (386 HA)

### GREEN INDUSTRIAL PARK AT JADCHERLA

GIP benefits from the long GIZ involvement and having already an operational SEZ as a pioneer in the centre of the park.

With a university included GIP has the potential for a liveable Industrial District that offers opportunities for a diverse set of jobs and education profiles. The proximity to the railway network could become a strong asset for attracting business and to have an alternative for cargo.

Properly sized common facilities and truck parking will be beneficial to workers and visitors alike, consolidating functions and preventing congestion.

Sufficient water supply is not in sight and thus recharging the groundwater level and reducing water demand is key for the success of the park.

Providing that the baseline for a certification is met the project has undergone a DGNB Pre-Assessment, resulting at a total of **69,3%** and a **Gold** level.

## ALEAP GRIP (32 HA)

### ASSOCIATION OF LADY ENTREPENEURS OF ANDHRA PRADESH AT NANDIGAMA

Placing female entrepreneurs and their startups in the center of the project introduces a new approach towards sustainability. Many aspects of a people driven Industrial Park go very well together with sustainable development and emphasise the often undervalued sociocultural component.

All industries within ALEAP GRIP are non-polluting and existing habitats are to be included in the concept.

PV is projected to provide 25% of the electricity demand on site and over 50% of the greywater is used for toilet flushing with blackwater treatment on site.

Electric vehicles are anticipated to be used in the park and sports facilities will be developed for the project.

Providing that the baseline for a certification is met the project has undergone a DGNB Pre-Assessment, involving the design team, resulting at a total of **80,3%** and a tight **Platinum** level.

## MPSEZ (1,114 HA)

MULTI-PRODUCT SPECIAL ECONOMIC ZONE AT NAIDUPETA

With over half of its space being dedicated for industrial products MPSEZ is facing the challenge of connecting an enclosed SEZ centre with non SEZ zones and existing urban developments.

Its scenic location at a partly dry river bed on one side and a hillock in the centre of the SEZ highlights its physical qualities that will help to define the build out of MPSEZ.

With larger facilities towards the edge of the development and smaller enterprises to be closer to the centre exchange of ideas and collaboration can be fostered.

With a Non Processing Area various options for lodging/housing are available and will provide for a complete Industrial Park - where living options are present to workers and their families.

Given that the baseline for a certification is met the project has undergone a DGNB Pre-Assessment, resulting at a total of **60,6%** and a **Silver** level.

## VATVA (527 HA)

VATVA INDUSTRIAL PARK AT AHMEDABAD

With Vatva Industrial Estate starting in 1968 we see the first steps built that initialized industrial revolution in Gujarat.

A highly successful park that is in the process of undergoing a rejuvenation of its industrial heritage. Being connected to the railway system and quite close towards the newly established BRT system of Ahmedabad VATVA has already become a part of the urban fabric, with planned and unplanned developments.

Being responsible for the development & maintenance of basic infrastructure the VIA - Vatva Industries Association is carefully looking at investments to be made at the right spot enabling VATVA to continue thriving for the next decades.

As a second generation project VATVA is looking for its identity which could be enriched by international cooperation.

## VAPI (902 HA)

VAPI INDUSTRIAL PARK AT VALSAD DISTRICT

With a strong desire from the VIA leadership to retrofit this fully operational and profitable Industrial Estate started in1971 first measures have already been taken to upgrade the district. With infrastructure in need of repair and many green initiatives taking place VIA is responding towards environmental damages caused by its early operation.

Time Magazine voted VAPI as one of the most polluted places in the world caused by chemicals and heavy metals with levels of mercury reportedly 96 times higher than WHO safety in a Blacksmith Institute report.

With proper measures taken under coordinated efforts a retrofitting towards a 'Global Green Industrial Park' seems possible, providing a healthier and safer place to work and live.

Providing that the baseline for a certification is met the project has undergone a DGNB Pre-Assessment, involving the design team, resulting at a total of **55,6%** and a **Silver** level.

# RESULT DGNB PRE-ASSESSMENT APSEZ

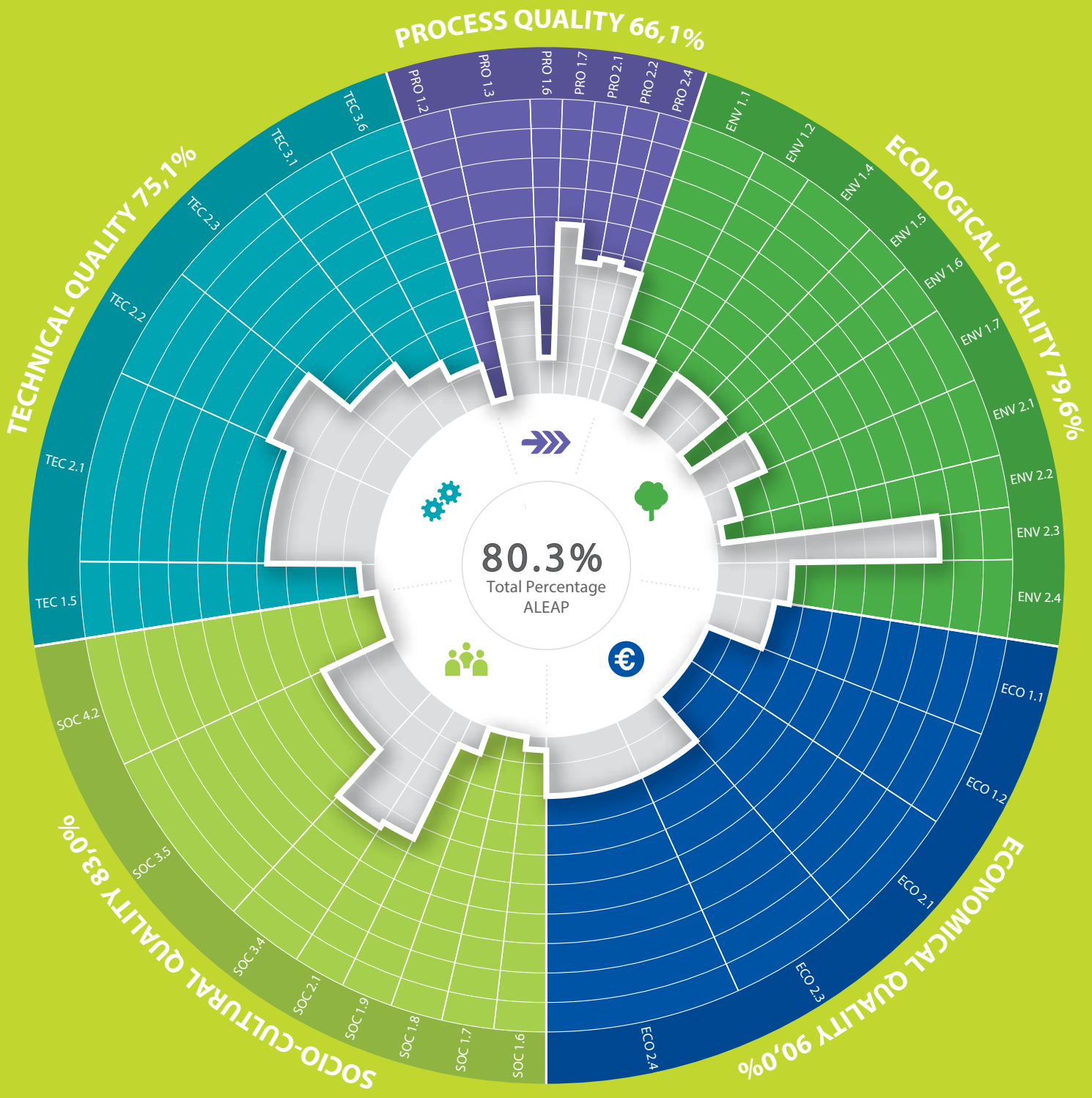



**Image 05:** Result of DGNB Pre-Assessment for ALEAP, October 2014

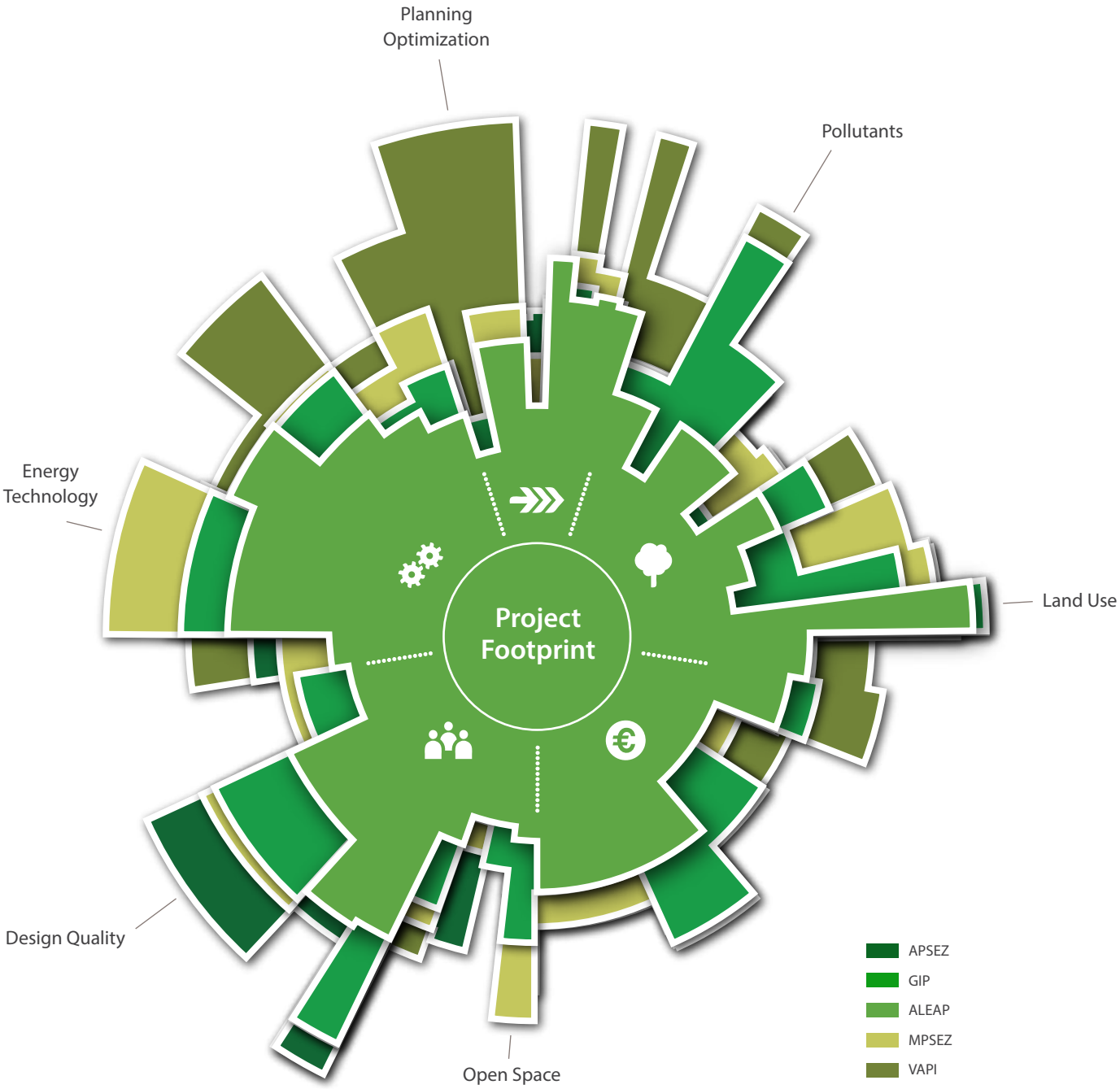



**Image 06:** Overlay DGNB Pre-Assessments

As a result of the five Pre-Assessments performed in October 2014 we see that all Industrial Parks have their very specific profile (see image above). The smallest footprint is to be aimed at and ALEAP has thus the biggest potential for a lighthouse project on Green Industrial Parks in India. Reasons are the social aspects of the project, the committed design team and the early stage of the project.

We recommend proceeding with DGNB Pre-Assessments for all the Industrial Parks to better their performance in Planning/Replanning and Operation to reduce their respective Environmental footprint and to strengthen its Economic and Social-Cultural performance.

# DEVELOPMENT OF TRAINING TOOL/MATERIAL AND KITS FOR SITE MASTER PLANNING

# TRAINING MATERIAL DEVELOPMENT

# TERM OF SUSTAINABILITY & TRAINING APPROACH

The training is built up on the concept of sustainability and is enhanced by additional components for its successful implementation.

Traditionally sustainability is described by three pillars system of equal and essential qualities and criteria. These three pillars also form the backbone of the DGNB's certification system:

- Environmental Quality
- Economic Quality
- Socio-Cultural Quality

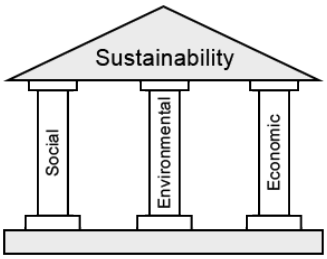



**Image 26:** Three columns of Sustainability

The concept of sustainability however only works if all the three pillars are considered to the same degree. If one of the pillars is weak, the system as a whole is unsustainable.

However in the development of the German Sustainable Building Council (DGNB system) it has been recognised that this concept does not reflect the complexities of bulit environment – building projects often heavily rely on the quality of the planning, design and implementation process. Hence the sustainability concept conveyed in the trainings goes beyond the well-known three-pillar model and includes:

- Technical Quality
- Process Quality

In addition BuroHappold has introduced 'Innovation' as a new component for the training tool and games. Innovation is a highly important aspect; nowadays strong global competition and rapid technological and digital progress forces companies to stay at the forefront of innovation. We hence have decided to amend the five chosen categories with this sixth category:

- Innovation Quality

**Synergies**

It is crucial to note that sustainability cannot be achieved by applying individual measures (though will improve the performance of buildings and neighbourhoods) but only through an integrated approach that balances the six criteria.

A strong focus of the training tool and games is set on learning about how to identify and best use synergies for a given project. The most rewarding synergies are often those that touch more than one column of sustainability and that are so far unprecedented.

**Costs and Impacts**

In an industrial operation costs are key. The most successful Industrial Parks are not those with endless funding but those that use the right amount of money for the right purpose at the right time.

Besides cost awareness the impact of a specific measure of importance. While it is hard to directly compare the costs and impact of one measure against another we have simplified the information on the basis of a card.

**Training Approach**

The basis for both the training and the games are circular icons that individually represent sustainability concepts, specifically selected to be relevant to Industrial Park developments in India. The icons are sorted and color-coded into categories inspired by the DGNB Industrial Districts Certification process:

- Ecological Quality
- Socio-Cultural Quality
- Economic Quality
- Technical Quality
- Process Quality
- Innovation Quality

# THREE PILLARS & THREE BANDS

As a result of the combination of the traditional Sustainability Concept (see image on previous page) with the DGNB scheme and our forward thinking under 'Innovation' the below illustrates the core understanding of the buildup of the 'Teaching Tool and Game for Green Industrial Districts'.

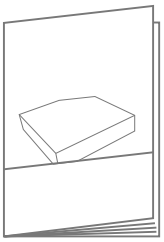

**Image 27:** Three pillars and Three bands of Sustainability

# TRAINING MATERIALS

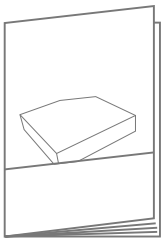
The following materials have been developed as part of the project and are made available digitally to the sole use of GIZ India and its appointed training providers.

In addition to the below the CD also includes the reports for 'Blue Collar Green I' and 'Blue Collar Green II' drafted in 2013 and 2014.

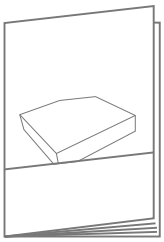

PRESENTATION SLIDES
FOR TRAINING SESSIONS



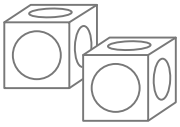
**FULL REPORT**
**BLUE COLLAR GREEN III**



TRAINING HANDBOOK
TRAINING THE TRAINERS

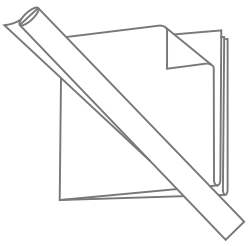


TRAINING HANDBOOK
FOR PARTICIPANTS

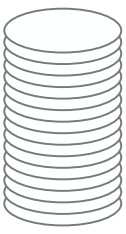


ICEBREAKER
DICE

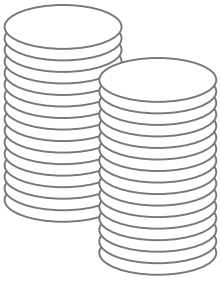
COMPILATION
OF ALL FILES



FULL PLAN WITH ICONS
FOR TRAINING SESSIONS



TEACHING TOOL
MAGNETIC CARDS



INTERACTIVE GAME
PLAYING CARDS

**Image 28:** Materials produced for 'Blue Collar Green III'


**Image 29:** Box designed for the Trainng Tool and Games

# DEVELOPMENT OF CUSTOMIZED TRAINING TOOL BOX


**Image 30:** Trainng Tool and Game Set with Icons layed out


COMPANY RECOGNITION
BROWNFIELD REDEVELOPMENT
SOCIAL INFRASTRUCTURE
SUPPORT / HELPDESK
CANDBOARD MANAGEMENT
TREE SELECTION & PRESERVATION
D.I.Y.

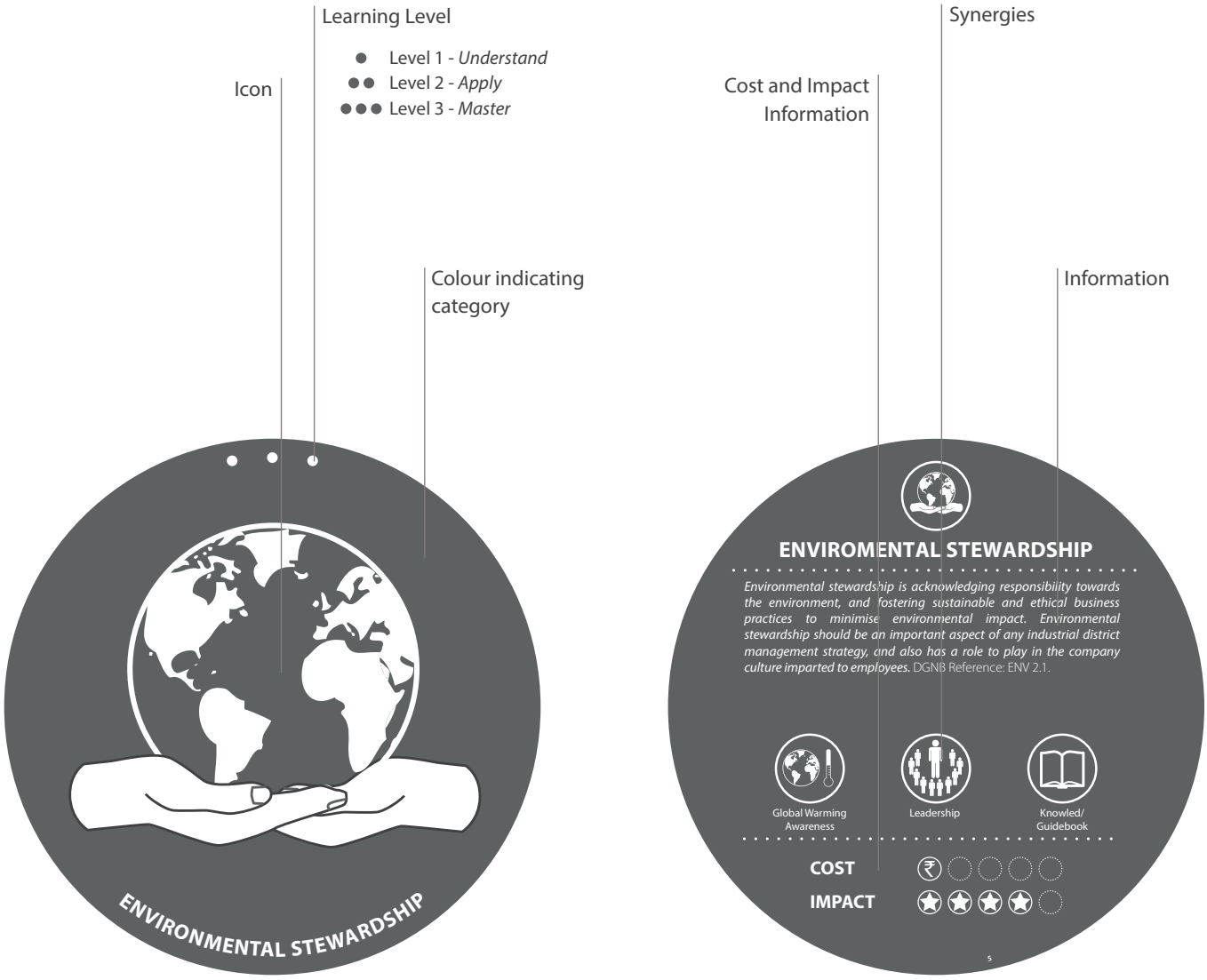
# TRAINING TOOL AND GAME OF ZONES

The Training Tool goes hand in hand with the Games. Both formats follow the pedagogy of applied learning in a mix of icebreakers, presentation, training and gaming with a continuous learning experience.

As a format circular icons have been produced for the game (double-sided on laminated paper) and for the training tool (single sided and magnetic). They can however also be printed at home and sticked together or be mounted on used CD or DVD disks.

Each icon for the 'Game of Zones' - a name suggested by the GIZ India - includes a memorable and easy-to-recognize graphic on one side, with a short explanation and further information on the other side related to:

- A sustainability concept's relative cost
- The impact for the user
- Opportunities for synergies



## ENVIRONMENTAL QUALITY SAMPLE



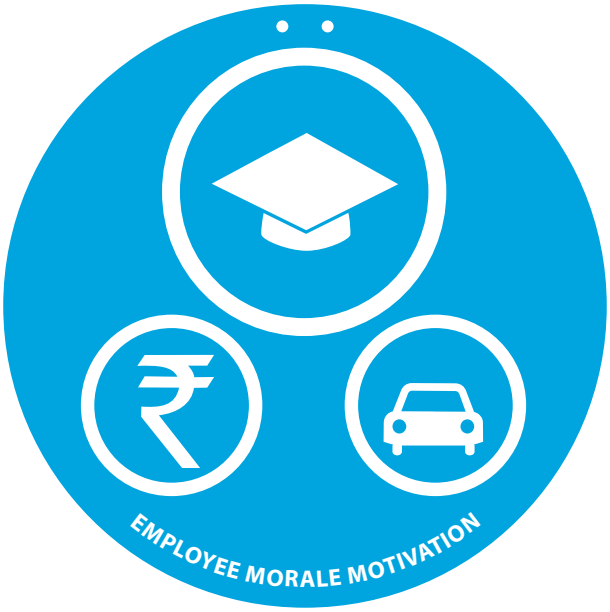
## ECONOMIC QUALITY SAMPLE


## TECHNICAL QUALITY SAMPLE



## PROCESS QUALITY SAMPLE


## SOCIO-CULTURAL QUALITY SAMPLE





## INNOVATION QUALITY SAMPLE


# TRAINING MATERIAL

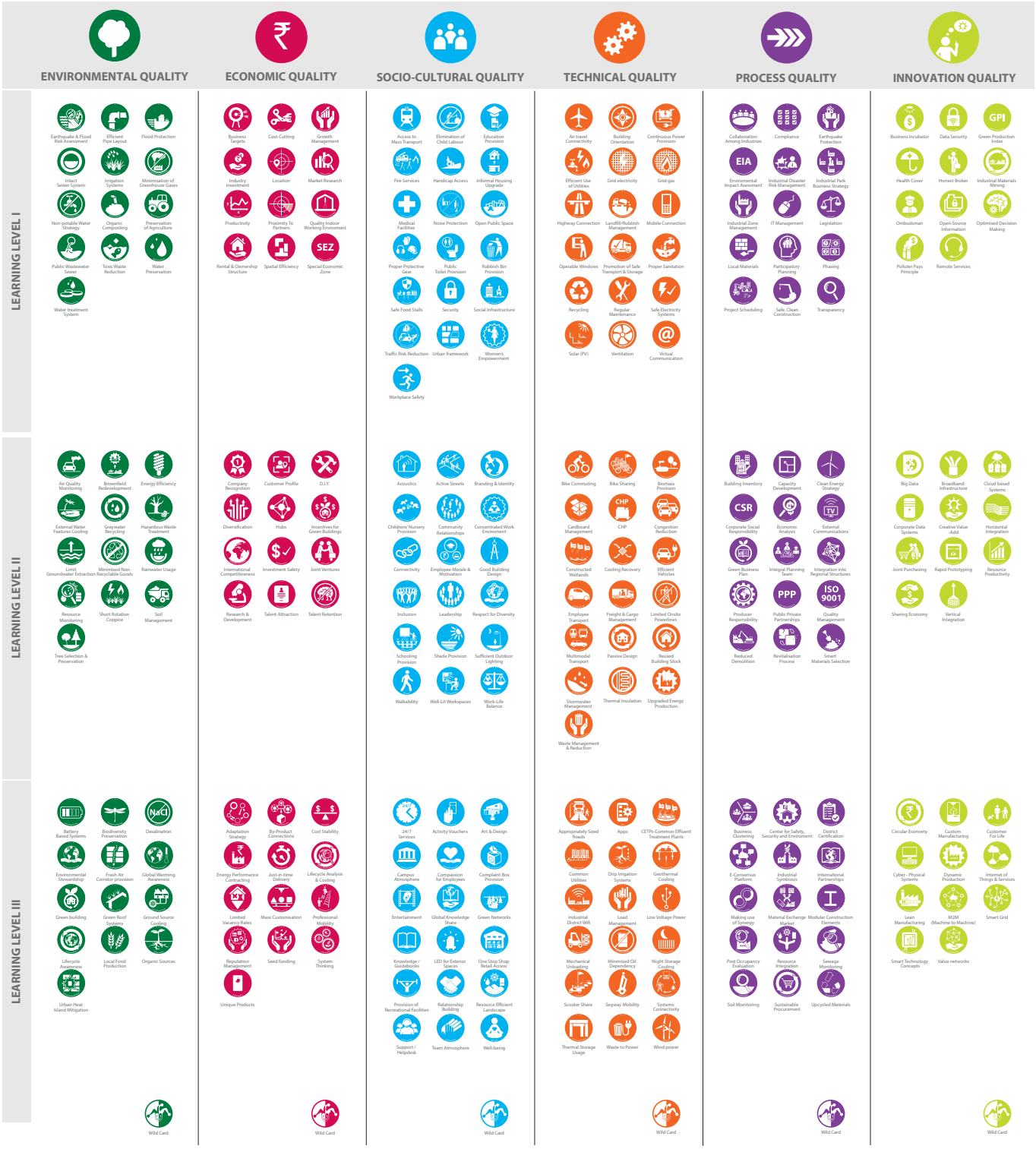



**Image 31:** Compilation of the Teaching Tool and Games

# ICEBRAKER - ROLL THE DICE

To allow an easy access to the topic and to dive into the playing mode we have developed a dice to randomly introduce an icon card from a pile in front of the participants.

Despite being a less structured and comprehensive approach it allows an immediate access to the topic and provides first learning results that are to be continued in the full games.

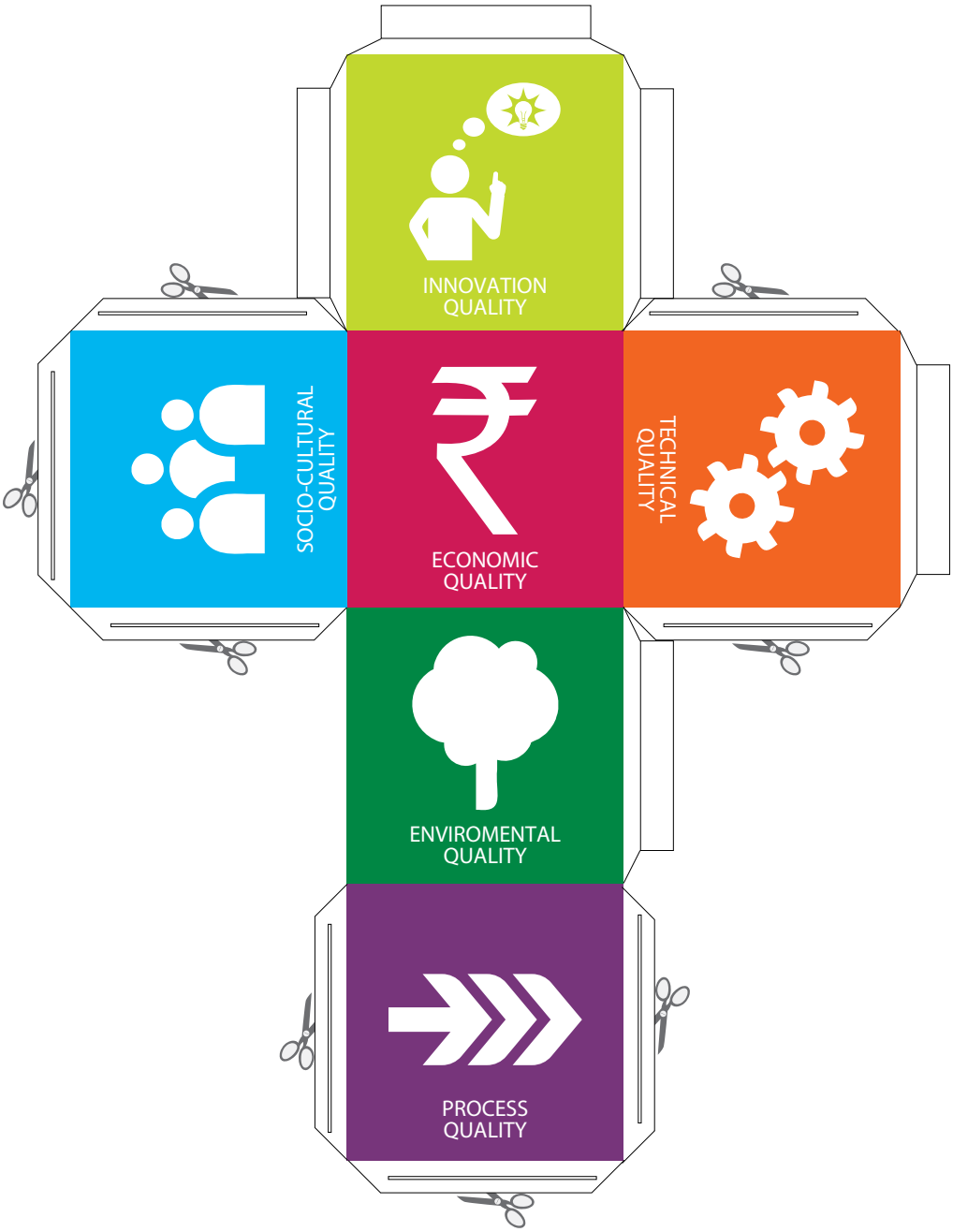



**Image 32:** Dice as Icebreaker for the Teaching Tool and Games


ENVIRONMENTAL QUALITY
ENV 1.1
ENV 1.2
ENV 1.4
ENV 1.5
ENV 1.6
ENV 1.7
ENV 2.1
ENV 2.2
ENV 2.3
ENV 2.4
ECO 1.1
ECO 1.2
ECO 2.1
ECO 2.3
ECO 2.4
SOC 1.6
SOC 1.7
SOC 1.8
SOC 1.9
SOC 2.1
SOC 3.4
TEC 3.6
PRO 1.2
PRO 1.3
PRO 1.6
PRO 1.7
PRO 2.1
PRO 2.2
PRO 2.4

# ENVIRONMENTAL QUALITY

Environmental Quality describes the capability of a development to not harm the environment or even increase the ecological value of an ara through development. This can be achieved by fostering resource efficiency, by improving the land use mix and the settlement structure in order to minimise greenhouse gas emissions or by enhancing the life cycle performance of buildings and settlements - and by bringing back nature to daily life.

## WHY IS IT RELEVANT TO INDIA?

Environmental efforts often come short at places of rapid urbanisation. While the term is mostly connected to green spaces they however have the potential to even weaken the Environmental Quality if planned wrong or in arid areas. Commercial developments should be aimed at the upgrading of brownfields rather than the use of virgin land that has a high to low agricultural potential. Key for India is the focus on clean and available water resources which includes effluent treatment. Green spaces should be adaptive to the local environment and can help to provider a better urban climate, recreation zones and agricultural production spaces. Key of all efforts is to understand the impact of individual measures to the system at large over a period of at least 50 years, a thinking fostering long term benefits.

## WHY IS IT RELEVANT TO INDUSTRIAL DISTRICTS?

Created predominantly for production purposes Industrial Districts often lack connections to the Environment. Mostly located in less favourable environments with limited water supply reduce environmental efforts towards adding vegetation that is not suited for the region and do demand water, space and maintenance.  A better approach is to enhance exiting vegetation and species, maybe even biotopes, and to reduce polluting the environment during construction but also operation. Raising the awareness of harmful substances and pollutants that are handled within the Industrial Districts and dealing withthem in a professional and environmentally sensitive way are essential for any Green Industrial Park. Ideally pollutants are phased out as much as possible and a strict control mechanism enforces the aspirations towards an Industrial Park for today and the generations to come.

# ENVIRONMENTAL QUALITY ICONS

## LEVEL I


Earthquake & Flood Risk Assessment


Efficient Pipe Layout


Flood Protection


Intact Sewer System


Irrigation Systems


Minimisation of Greenhouse Gases


Non-potable Water Strategy


Organic Composting


Preservation of Agriculture


Public Wastewater Sewer


Toxic Waste Reduction


Water Preservation


WaterTreatment System

## LEVEL II


Air Quality Monitoring


Brownfield Redevelopment


Energy Efficiency


External Water Features Cooling


Greywater Recycling


Hazardous Waste Treatment


Limit Groundwater Extraction


Minimised Non-Recyclable Goods


Rainwater Usage

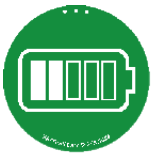

Resource Monitoring


Short Rotation Coppice


Soil Management


Tree Selection & Preservation

## LEVEL III



Battery Based Systems

Biodiversity Preservation


Desalination

Environmental Stewardship

Fresh Air Corridor provision

Global Warming Awareness

Green building

Green Roof Systems

Ground Source Cooling

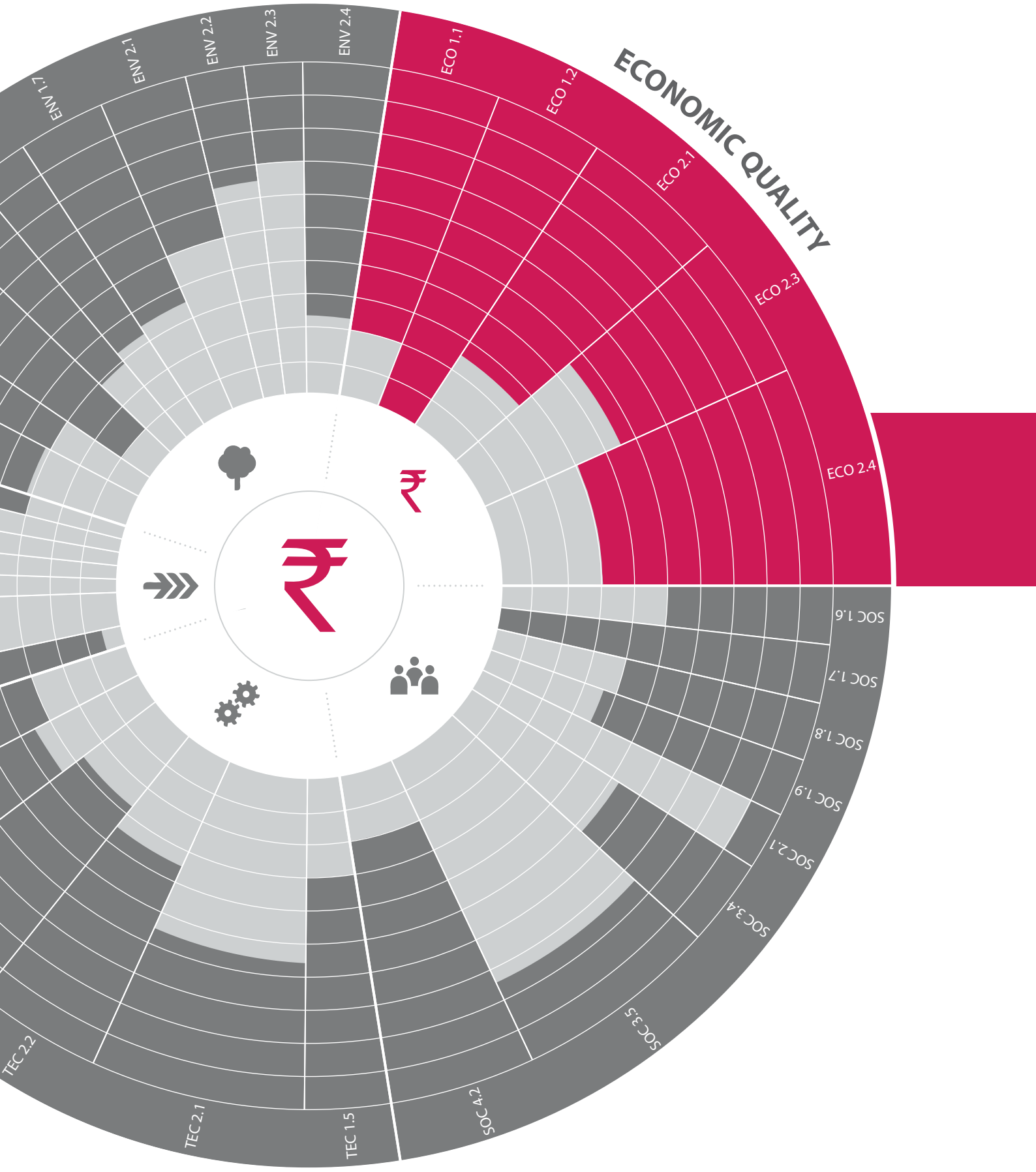
Lifecycle Awareness

Local Food Production

Organic Sources

Urban Heat Island Mitigation

Wild Card


ECONOMIC QUALITY
ECO 1.1
ECO 1.2
ECO 2.1
ECO 2.3
ECO 2.4
ENV 2.4
ENV 2.3
ENV 2.2
ENV 2.1
ENV 1.7
SOC 1.6
SOC 1.7
SOC 1.8
SOC 1.9
SOC 2.1
SOC 3.4
SOC 3.5
SOC 4.2
TEC 1.5
TEC 2.1
TEC 2.2

# ECONOMIC QUALITY

In the built environment Economic Quality can be defined twofold: First, it describes the capability of a development to build a strong, responsive and competitive economy, to create employment and to produce and maintain the highest added value. Second, it means that the development is cost efficient through its entire life cycle and commercially viable for the investor as well as flexible and adaptable to change.

## WHY IS IT RELEVANT TO INDIA?

With India being the nineth-largest economy in the world by nominal GDP and the third-largest by purchasing power parity in the last quarter of 2014 it became the world's fastest growing economy, replacing China. The speed and need for built environment requires applicable and reliable financial concepts that do allow India to stay ahead of its global competitors by at the same time further developing the country. It is about spending the right money at the right time for the right purpose - an ambition that needs to be supported from multiple angles. There are investments that are made once without follow-up costs, however most money invested does require further attention to last over time - and to proof as a sustainable investment.

## WHY IS IT RELEVANT TO INDUSTRIAL DISTRICTS?

Economics are the reason for being of most Industrial Districts, in particular SEZs. While there are overall concepts on creating and operating Industrial settlements, understanding the full life costs of a development over a period of at least 50 years can be eye-opening to all stakeholders. Often the construction costs of Industrial districts are only 25% of the lifetime costs associated with the overall project, from however different sources. Understanding the individual financial flows can enable to make decisions that benefit in the long run. A clear financial concept that allows for major repairs at times needed and to constantly reduce resource consumption is a key indicator for a successful and responsible Green Industrial Park in India and beyond.

# ECONOMIC QUALITY ICONS

## LEVEL I


Business Targets


Cost-Cutting


Growth Management


Industry Investment


Location


Market Research


Productivity


Proximity To Partners


Quality Indoor Working Enviroment


Rental & Ownership Structure


Spatial Efficiency

Special Economic Zone

## LEVEL II


Company Recognition


Customer Profile


D.I.Y.


Diversification


Hubs


Incentives for Green Buildings


International Competitiveness


Investment Safety


Joint Ventures


Research & Development


Talent Attraction


Talent Retention

## LEVEL III

Adaptation Strategy

By-Product Connections

Cost Stability

Energy Performance

Just-in-time Delivery

Lifecycle Analysis

Limited Vacancy Rates

Mass Customisation

Professional Mobility

Reputation Management

Seed funding

System Thinking

Unique Products

Wild Card


SOCIO-CULTURAL QUALITY
SOC 1.6
SOC 1.7
SOC 1.8
SOC 1.9
SOC 2.1
SOC 3.4
SOC 3.5
SOC 4.2
TEC 1.5
TEC 2.1
TEC 2.2
TEC 2.3
TEC 3.1
TEC 3.6
PRO 1.2
PRO 1.3
PRO 1.6
PRO 1.7
PRO 2.1
PRO 2.2
PRO 2.4
ENV 1.1
ECO 2.3
ECO 2.4

# SOCIO-CULTURAL QUALITY

In the built environment Socio-Cultural Qualities describe the capability of a project to support vibrant and healthy communities. This can be achieved by providing the supply of adequate housing required to meet the needs of present and future generations and by creating a high quality built environment, with accessible local services supporting the health and the social and cultural well-being of places. Those often underestimated 'soft' components of development are crucial for keeping workers in the long run and within the Industrial District as healthy, educated and balanced employees.

## WHY IS IT RELEVANT TO INDIA?

The flavor of a place comes through its people and their cultures. While many efforts towards a more sustainable society require either political will or financial support, socio-cultural efforts can also come from people that love their city, home and work - and most importantly - their fellow men and colleagues. Good public spaces are created by life and enhanced by planning. Those are the urban glue between neighborhoods, industries, etc. and need to be informed by people living and/or working there. In densely populated areas accessibility to good infrastructure is essential to reduce traffic congestion, air pollution and travel time. To comfortably move within a settlement of any given size requires trust in its safety and security - both needed during day and night. Much in that field comes through ambition and willingness to make it a better place inside and outside at any given time.

## WHY IS IT RELEVANT TO INDUSTRIAL DISTRICTS?

The time for Industrial Districts being purely places of production has passed towards citiesque structure often merging with settlements. In a time where talent retention is essential for any successful operation it is important to provide good planning and access to the job with basic social functions within the Industrial District to serve the needs of their workers and families. Connecting a comfy feeling with the workplace and location will allow for more productive and committed workers. That can be achieved by providing a well-lit, well ventilated, noise controlled and secure environment that invite people to spend more than just the working hours within the area. Industrial Districts should be places not only for work but also for continuous learning that provide quality spaces and allow to relax and to rejuvenate.

# SOCIO-CULTURAL QUALITY ICONS

## LEVEL I


Access to Mass Transport


Elimination of Child Labour


Education Provision


Fire Services


Handicap Access


Informal Housing Upgrade


Medical Facilities


Noise Protection


Open Public Space


Proper Protective Gear


Public Toilet Provision


Rubbish Bin Provision


Safe Food Stalls


Security


Social Infrastructure


Traffic Risk Reduction


Urban framework


Women's Empowerment


Workplace Safety

## LEVEL II


Acoustics


Active Streets


Branding & Identity


Childrens' Nursery Provision


Community Relationships


Concentrated Work Enviroment


Connectivity


Employee Morale Motivation


Good Building Design


Inclusion


Leadership


Respect for Diversity

Schooling Provision

Shade Provision

Sufficient Outdoor Lighting

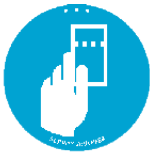
Walkability

Well-Lit Workspaces

Work-Life Balance

## LEVEL III


24/7 Services



Activity Vouchers

Art & Design

Campus Atmosphere

Compassion for Employees

Complaint Box Provision

Entertainment

Global Knowledge Share

Green Networks

Knowledge / Guidebooks

LED for Exterior Spaces

One Stop Shop Retail Access

Provision of Recreational Facilities

Relationship Building

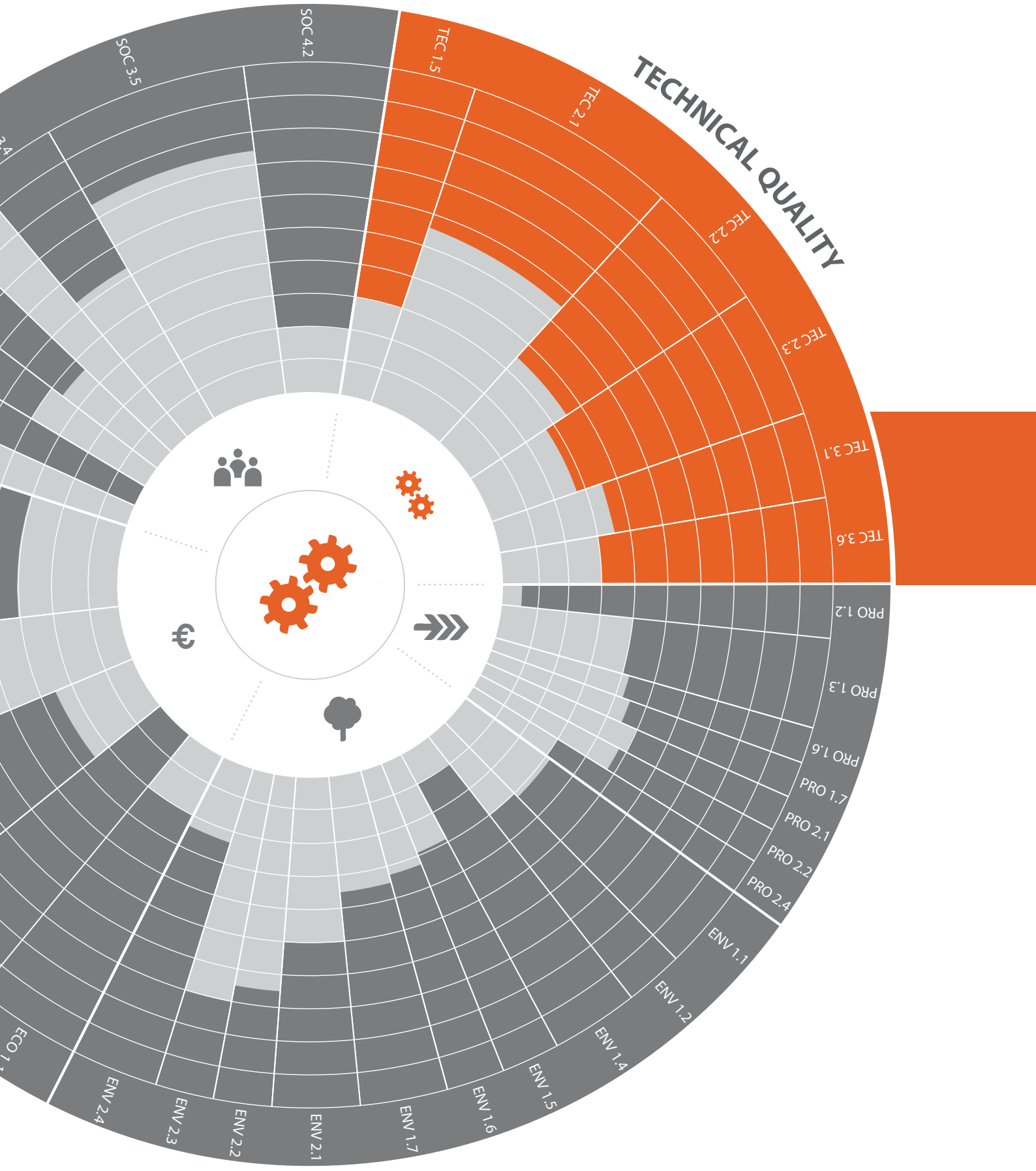
Resource Efficient Landscape

Support / Helpdesk

Team Atmosphere

Well-being

Wild Card


TECHNICAL QUALITY
TEC 1.5
TEC 2.1
TEC 2.2
TEC 2.3
TEC 3.1
TEC 3.6
PRO 1.2
PRO 1.3
PRO 1.6
PRO 1.7
PRO 2.1
PRO 2.2
PRO 2.4
ENV 1.1
ENV 1.2
ENV 1.4
ENV 1.5
ENV 1.6
ENV 1.7
ENV 2.1
ENV 2.2
ENV 2.3
ENV 2.4
SOC 4.2
SOC 3.5

# TECHNICAL QUALITY

Technical Quality is the essence of a thriving and sustainable economy. Indian Space Exploration shows the world the advanced technologies available and are more and more to be seen in the Industrial sector. as well Technical Quality however demands well trained and educated people that excel the brand 'Made in India' to new heights. The number of scientific publications in India grew by 45% over the past years and with the newly launched governmental initiative 'Make in India' much international best practice will be added to the already promising developments.

## WHY IS IT RELEVANT TO INDIA?

Without the proper technical solutions India would fall behind other nations competing on the global market. With low production costs too often being the dominant driver of production, the increase of Technical Quality in production as well as building can help to speed up the process, to reduce health risks and to provide a nationally and internationally more competitive setting. Technology is in place to make life easier but needs to be applied in a socially sensitive way.

## WHY IS IT RELEVANT TO INDUSTRIAL DISTRICTS?

Within an Industrial District the focus is on the quality of its technical appliances, their energy efficiency and self-sufficiency. That chapter however also covers the maintenance of all exterior space, be it roads or waterways, pedestrian space or green areas is achieved by planning and building the right infrastructure for the right place. It also includes considerations on Waste Management and Recycling and Stormwater Management - that do not always need technical solutions but are always critical in the creation of Green Industrial Districts. Logistics and traffic are center pieces and require a good technical infrastructure to function in the most efficient way to reduce congestion, waiting time and parking space and that allow for faster loading and unloading associated with higher profits.

# TECHNICAL QUALITY ICONS

## LEVEL I


Air travel Connectivity


Building Orientation


Continuous Power Provision


Efficient Use of Utilities


Grid electricity


Grid gas


Highway Connection


Landfill/Rubbish Management


Mobile Connection


Operable Windows


Promotion of Safe Transport & Storage


Proper Sanitation


Recycling


Regular Maintenance


Safe Electricity Systems


Solar (PV)


Ventilation


Virtual Communication

## LEVEL II


Bike Commuting


Bike Sharing


Biomass Provision


Cardboard Management

CHP


Congestion Reduction


Constructed Wetlands


Cooling Recovery


Efficient Vehicles


Employee Transport


Freight & Cargo Management


Limited Onsite Powerlines

Multimodal Transport

Passive Design

Reused Building Stock

Stormwater Management

Thermal Insulation

Upgraded Energy Production

Waste Management & Reduction

## LEVEL III

Appropriately Sized Roads

Apps

CETPs-Common Effluent Treatment Plants

Common Utilities

Drip Irrigation

Geothermal Cooling

Industrial District Wifi

Load Management

Low Voltage Power

Mechanical Unloading

Minimised Oil Dependency

Night Storage Cooling

Scooter Share

Segway Mobility

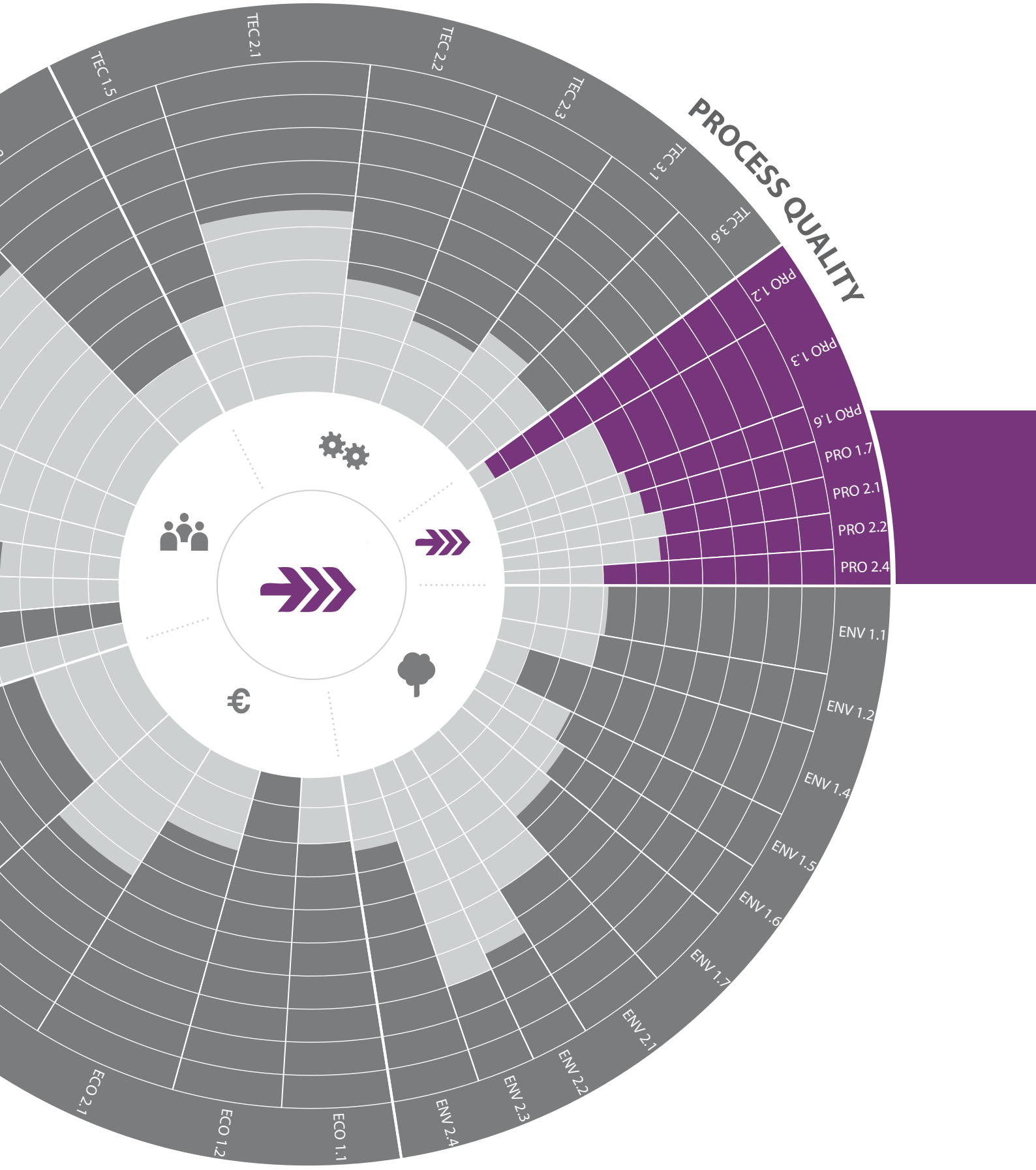
Systems Connectivity

Thermal Storage Usage

Waste to Power

Wind power

Wild Card


PROCESS QUALITY
TEC 1.5
TEC 2.1
TEC 2.2
TEC 2.3
TEC 3.1
TEC 3.6
PRO 1.2
PRO 1.3
PRO 1.6
PRO 1.7
PRO 2.1
PRO 2.2
PRO 2.4
ENV 1.1
ENV 1.2
ENV 1.4
ENV 1.5
ENV 1.6
ENV 1.7
ENV 2.1
ENV 2.2
ENV 2.3
ENV 2.4
ECO 1.1
ECO 1.2
ECO 2.1
€

# PROCESS QUALITY

More than any financial investment at large Process Quality is the real driver behind successful Green Industrial Parks. With good communication, organisation and collaboration seemingly difficult tasks can become reality. With all stakeholders at the table valuable discussions, meetings, workshops or panels can take place - with a vast array of new media option bringing the community and the industries closer together.

## WHY IS IT RELEVANT TO INDIA?

Being traditionally trained to think in silos leads to independent problem solving that however does not always create the best result. Sticking heads together and looking at multiple angles of a problem and its solution makes sure to consider all relevant aspects needed to find the right solution. It is thus also to bring the right players at the table, often earlier than in a conventional planning situation. Doing so makes more people to buy in the project and to identify themselves with the collectively developed concepts.

## WHY IS IT RELEVANT TO INDUSTRIAL DISTRICTS?

Industrial Districts are the most difficult planning scenarios due to its complexities caused by the production process. While the processes happen inside a production facility are well known and often optimized the outer connection to the rest of the Industrial Park or community are not fully used. In fact with the same planning rigor that is applied inside the production facility applied outside, a more sustainable Industrial Park is already at reach. Getting to know each other and finding out how to best utilise the talent and experience that already exists within the Industrial Park is the first step towards a Green Industrial Park. Include as many stakeholders as possible and discuss the concept with all the people that are affected by it, be it positively or more critical.

# PROCESS QUALITY ICONS

## LEVEL I


Collaboration Among Industries


Compliance


Earthquake Protection

Enviromental Impact Asessment

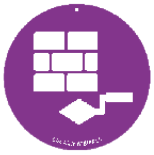

Industrial Disaster Risk Management


Industrial Park Business Strategy


Industrial Zone Management


IT Management


Legislation


Local Materials


Participatory Planning

Phasing


Project Scheduling


Safe, Clean Construction


Transparency

## LEVEL II


Building Inventory


Capacity Development


Clean Energy Strategy

Corporate Social Responsibility


Economic Analysis

External Communications


Green Business Plan


Integral Planning Team


Integration into Regional Structures


Producer Responsibility

Public Private Partnerships

Quality Management


Reduced Demolition


Revitalisation Process


Smart Materials Selection

## LEVEL III

Business Clustering

Center for Safety, Security and Enviroment

District Certification

E-Consensus Platform

Industrial Symbiosis

International Partnerships

Making use of Synergy

Material Exchange Market

Modular Construction Elements

Post Occupancy Evaluation

Resource Integration

Sewage Monitoring

Soil Monitoring

Sustainable Procurement

Upcycled Materials

Wild Card


PRO 1.3
PRO 1.6
PRO 1.7
PRO 2.1
PRO 2.2
PRO 2.4
ENV 1.1
ENV 1.2
ENV 1.4
ENV 1.5
ENV 1.6
ENV 1.7
ENV 2.1
ENV 2.2
ENV 2.3
ENV 2.4
ECO 1.1
ECO 1.2
ECO 2.1
ECO 2.3
ECO 2.4
SOC 1.6
SOC 1.7
SOC 1.8
SOC 1.9
SOC 2.1
TEC 3.1
TEC 3.6
PRO 1.2

# INNOVATION QUALITY

While thriving towards the experience of suddenly understanding a previously incomprehensive problem, also called the eureka effect, it is often small adjustments that are already innovative within the system. Innovation can be viewed as the application of better solutions in daily life that meet current and new requirements and inarticulated needs - a treasure for all Industrial Parks. Innovation can come from anyone at any time and thus creativity should be fostered at all levels and a platform provided for the eager minds within an operation.

## WHY IS IT RELEVANT TO INDIA?

India has set up the 'India Innovation Growth Programme' as a joint initiative by various partners to accelerate innovative Indian technologies into global markets. However some of the biggest innovations happen in practice and outside labs or innovation centres. Innovation clusters or regional initiatives to exchange ideas and to present them to a wider audience would be beneficial. While those are mostly connected to academic institutions access is limited and would normally not include Blue Collar workers that are as capable for innovations as professionally trained engineers, etc.

## WHY IS IT RELEVANT TO INDUSTRIAL DISTRICTS?

There is no other field that is so much in need for innovation than industrial production. More effective products, processes, services, technologies or ideas provide a knowledge advantage and help to succeed on the global market. While innovations cannot be achieved instantly the externalities of physical space need to be enhanced to a good level providing a breeding ground for innovation and new ideas. What is innovative today might already be common practice tomorrow, thus innovation is more the fruit of a process rather than a moment in time.

# INNOVATION QUALITY ICONS

## LEVEL I


Business Incubator


Data Security

Green Production Index


Health Cover


Honest Broker


Industrial Materials Mining


Ombudsman


Open-Source Information


Optimised Decision Making


Polluter Pays Principle


Remote Services

## LEVEL II


Big Data


Broadband Infrastructure


Cloud based Systems


Corporate Data Systems


Creative Value -Add


Horizontal Integration


Joint Purchasing


Rapid Prototyping


Resource Productivity


Sharing Economy


Vertical Integration

## LEVEL III


Circular Economy

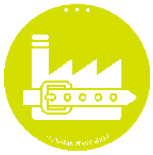

Custom Manufacturing


Customer For Life

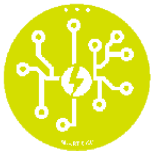

Cyber - Physical Systems


Dynamic Production


Internet of Things & Services


Lean Manufacturing


M2M (Machine to Machine)


Smart Grid


Smart Technology Concepts


Value networks


Wild Card

# DEVELOPMENT OF INTERACTIVE GAME

# ICEBREAKER

**Objective:**

A simple game to start the conversation on the main principles of sustainability. Participants role a dice to choose a focus area, and then pick an icon from the category and explain why they have chosen it. The facilitator will use the dice as an opportunity to explore the concepts in more detail with the participants and lead a discussion.

**Setup:**

The icebreaker can be played by up to 6 players, ideally using two dice. The players sit around a table or floor with the facilitator. For each level, the respective icons are selected and put icon-side up on the table together with the dice.

**Rules:**

The facilitator appoints the first player to roll the dice. Each player takes than a turn to roll the dice going around in a circle. After rolling one of the dice, the participant selects two icons from the category shown on the die and introduces the concepts to the group. For beginner groups, the players read the descriptions to explain them, for more advanced groups (Level 2 or 3), players describe more of their own experience with, and comprehension of, the concept. If needed, after each roll, the facilitator explains the concepts introduced and takes any questions.

After completing the Icebreaker, players may be interested in the more proactive approaches of the subsequent games, in which players can interact with a wider range of icons and make more deliberate choices about how they would like to design their own Industrial Park.

Differing Rules of Play for each Level:

- **Level 1:**

Each participant rolls the die. The participant then selects two icons from the selected category, reads the supporting information and explains the icons to the group. Any icon can be selected – the intention is to follow the general interests and curiosities of the participants.

- **Level 2:**

Each participant rolls the die. The participant then selects two icons from the selected category, reads the supporting information if needed and explains to the group why the methods would be relevant to a specific site or project. The intention is to share experiences with similar concepts and lessons learned implementing.

- **Level 3:**

Each participant rolls the die. The participant then selects two icons from the selected category and presents not only the concept but the synergies indicated across the categories by picking the synergy cards. The intention is to explore how the concepts can be applied and which concepts complement each other in various situations.

**The winner** – this is purely for fun, no winner.

# GAME OF ZONES

**Objective:**

An advanced game that will build on the knowledge gained in the icebreaker and training sessions, aiming to address the application of the principles to a Green Industrial Park. Each participant picks icons from each category, applies them to a plan of a chosen or generic industrial site and explains his choice and the respective location. The session will be facilitated by a moderator that will support the participants by explaining how the sustainable planning methods can be used and where they may be most useful or efficiently delivered. This game is to enable the participants to apply and spatialise broader concepts of sustainability to Industrial Districts.

The game also aims to identify synergies across categories and to discuss the concepts in a team and between groups. The facilitator will use the game as an opportunity to explore the concepts in more detail with the participants and to lead a discussion.

**Setup:**

The required number of players for this game is 6 players, the limit should be 30 players. The players sit around a table with the facilitator. For each level, the respective icons are selected and put icon-side up on the table.

- **Level 1:** The icons selected for the game are restricted to Level 1 icons only.
- **Level 2:** The icons selected for the game are focused on Level 2 icons but can be enhanced by Level 1 icons (in case of more participants).
- **Level 3:** The icons selected for the game are restricted to Level 3 icons but can be enhanced by Level 1 and Level 2 icons (in case of more participants).

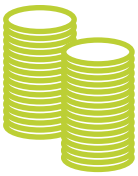
**Rules :**

For each category the facilitator defines a group of players; each group should consist of one player minimum, with up to 6 players maximum. The facilitator chooses a category for each group and picks 10 cards from the respective category for the group. In that game it makes sense to allocate a topic (like ECO) to an individual or group that are normally not working in that specific field. A change of perspective might allow for an out of the box thinking and trigger an understanding for other interest within an Industrial District.

Each group than has 5 minutes to internally discuss the icons and to create a planning concept, that needs to include 5 out of the 10 icons. The concept can be elaborated taking the information at the back of the cards as support. After the group work, the concepts are then presented in a short statement by each group to the other groups and the facilitator going around in a circle. After the presentation the game pursues with a second round of group work – the facilitator defines two groups that are working together to develop a joint concept made up of their selected five icons. This second session focuses on synergies between icons and categories – in order to develop the story the information on the back of the cards regarding synergies can used. The groups get 5 minutes to negotiate on which icons to use and which is a strong concept to propose. After the phase of group work, the teams present their work to each other.

**The winner** – the team with the most convincing concept - is selected by vote.

# DESIGN YOUR INDUSTRIAL PARK



**Objective:**

The game aims at raising awareness for the different views of other stakeholders involved in the planning of Industrial Parks in India and at applying concepts to a specific site. The players will take different roles and views of stakeholders, work together in teams with other stakeholders and prepare a combined vision for a typical Industrial Park. The game will train the participants in negotiating, compromising and developing planning concepts.

**Setup:**

A minimum of 6 players (playing individually) up to 24 maximum (playing in 6 team with 4 persons) gather around a table with all icons (Levels 1-3) and all magnetic cards icon side up. **This is a game only suitable for Level 3 participants.**

**Rules:**

The players around the table are given an individual role by the facilitator. There are six roles that the facilitator will assign to the players reflecting the typical training target groups:

- Policy Maker (e.g. Mayor, Governor etc.)
- Investor and Developer (e.g. Industrial Association)
- Bank and Financial Institution
- Industrial Production (from Manager to Blue Collar Worker)
- Urban Planner/Architect (either private/public)
- Environmental Consultant

Players should each adopt an identity as an individual interested in Industrial Park development, ideally a field the player is not involved on at a daily basis. Each must consider the likely priorities and preferences of the role, but must also seek to look beyond obvious preferences and interests by creating a plan which stretches across the six categories, and includes synergies.

Each player or team can then pick 20 cards, she or he or believes are important for the design of an Industrial Park from the perspective of his role. The players can examine the cards at their own speed, reading the descriptions on the back of each card and determining whether they would like to keep the card for their Industrial District Plan.

After this initial selection the facilitator chooses two parties to play together, e.g. by assigning a policymaker and an environmental consultant in one team. The decision of whom to assign shall be made by the facilitator based on his expertise, but the combination should reflect real-life situations aiming at creating groups that might regularly negotiate when planning Industrial Parks.

The teams now start a phase of group work and design their Industrial Park. Out of the 40 cards in total, each team picks 20 cards, i.e. features, for their park – this will require reflecting concepts from their role perspective, negotiating with the team partner and trying to convince them. After the 20 park features are chosen the team applies the magnetic cards on a plan of a generic Industrial Park, that the facilitator needs to provide.

The facilitator should observe the group and set a time for them to assemble their Industrial District concepts from the cards available. The group may need calls for the halfway point and other time checks.

When the time is up and all groups have collected their cards, each should present their vision. Players should explain why they have chosen cards but also why they decided to discard icons.

The facilitator can elaborate on discussions, providing context, direction and examples of implementation of the different sustainability concepts.

**The winner** – the most complete and convincing proposal - will be selected by vote of the teams.

# INDUSTRIAL POKER

**Objective:**

A more complex and interactive game with the icons being used as cards. This involves a dealt hand of a small number of the icons, followed by the selection or trading of other icons, until a participant has an agreed number and combination of cards. This option is very playful and introduces luck and interplayer dynamics into the game itself. In a Poker-like session players aim to collect a hand of up to 6 cards with the following represented in the hand:

- Each one of the 6 coloured categories represented (Levels 1, 2, 3)
- At least 3 'Synergies' between cards (Level 3 only)

**Setup:**

Between 4 and 8 players sit around a large selection of the cards arranged icon side-up – anywhere from 80 to 120 cards would be appropriate. From these cards each player should be dealt 3 cards as a starter hand by the facilitator – these should be random.

**Rules:**

The first player can pick any card out of the selection on the table. Once the player has picked a card, he or she has committed to that card for that turn. In every round it is the player's choice whether to just pick a card (growing their hand by 1) or to exchange a card (keeping their hand the same size, but discarding an unwanted card in exchange for the new card). 6 cards is the maximum size in the hand so after a player has this many cards, only trades are permitted.

The game then moves clockwise among players.

The game will continue until a player feels that they have accomplished all the criteria to call 'Stop'. This includes having:

- Up to 6 cards with all categories represented (Levels 1, 2, 3)
- Having a set of cards with low cost points and maximum input points (Levels 1, 2, 3)
- Having at least 3 synergies (Level 3 only)

After 'Stop', each player will present his or her Industrial District's total cost, total impact and number of synergies (Level 3 only). All of this information is available on the back of each card. Most likely, 3 different 'winners' will emerge – the player with the highest impact, the player with the lowest cost, and the player with the most synergies (Level 3 only).

Each player will then present their Industrial District concept and the rationale behind it to the group, explaining why they choose the cards that they did, and how their plan may be relevant to their type of site, particular interests or sector.

The presentations should then lead to a broader conversation led by the facilitator, touching on strategies for designing a sustainable industrial park, cost implications and trade-offs, the opportunities for generating strong impact with low-cost interventions and how the different sustainability concepts work in tandem, creating synergies.

Differing Rules of Play for Each Level:

**Levels 1:**

Follow Game Rules, beginning with a dealt hand of 3 cards (Level 1 icon sets) and concluding with a hand of 6. At the conclusion, players should consider the total cost and impact of the hand.

**Levels 2:**

Follow Game Rules, beginning with a dealt hand of 3 cards (Level 2 icon sets) and concluding with a hand of 6. At the conclusion, players should consider the total cost and impact of the hand.

**Level 3:**

Follow Game Rules, beginning with a dealt hand of 3 (Level 3 icons) and concluding with a hand of 6. At the conclusion, players should consider the total cost and impact of the hand and the synergies.

**The winner** is the player with:

- The lowest cost points (Levels 1, 2, 3)
- the highest impact points (Levels 1, 2, 3)
- the highest number of synergies (Level 3 only)

# ICEBREAKER

**Objective:**

- Learn and discuss the different dimensions of sustainability and why they are relevant to Industrial Sites in India.

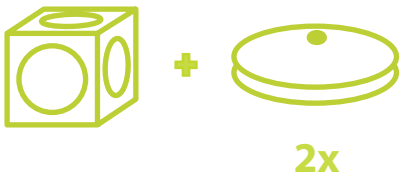
**Setup:**

- The game can be played by up to 6 players
- The players sit around a table with the facilitator
- For each level, the respective icons are selected and put icon-side up in the table together with the dice


**Playing the Game:**

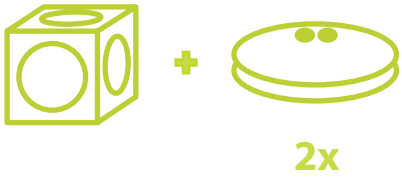
**Level 1**

1. The facilitator appoints the first player to roll the dice
2. Each participant rolls the dice going around in a circle
3. The participant then selects two icons from the selected category, reads the supporting information and explains the icons to the group. Any icon can be selected




**Level 2**

1. The facilitator appoints the first player to roll the dice
2. Each participant rolls the dice going around in a circle
3. The participant then selects two icons from the selected category, reads the supporting information if needed and explains to the group why the methods would be relevant to a specific site




**Level 3**

1. The facilitator appoints the first player to roll the dice
2. Each participant rolls the dice going around in a circle
3. The participant then selects two icons from the selected category, and presents not only the concept but the synergies indicated across the categories by picking the synergy cards


**Winner:**

- The icebreaker game will be played without a winner

# GAME OF ZONES

**Objective:**

- Learn about the different sustainability concepts, identify synergies across categories and to discuss the concepts in a team and between groups

**Setup:**

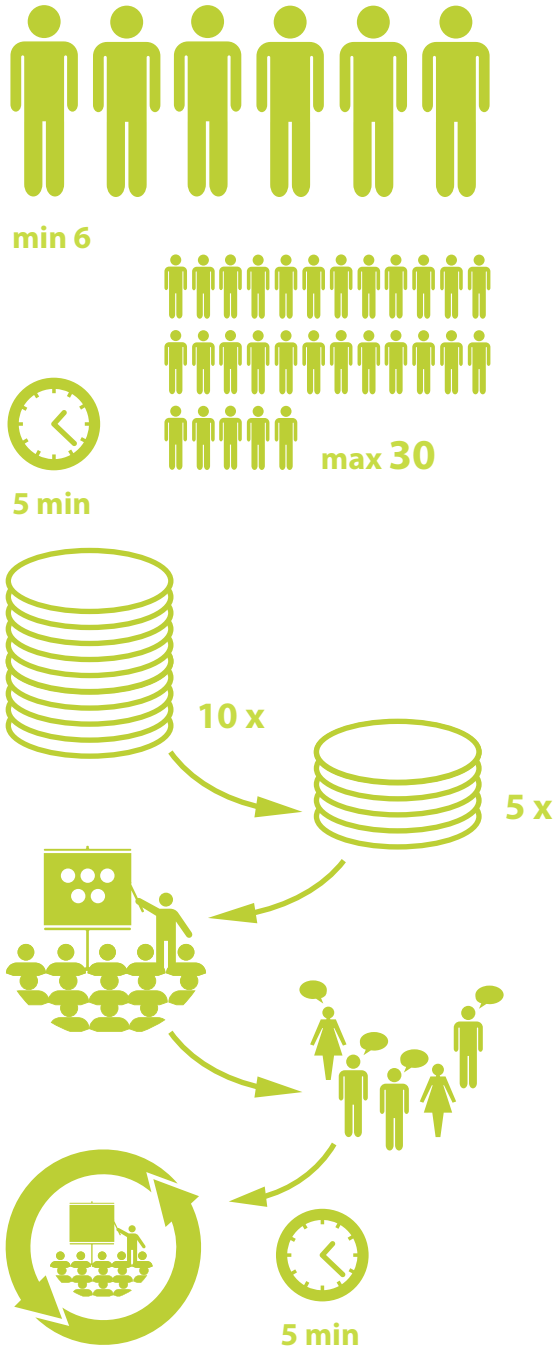
- The required number of participants for this game is 6 players
- The limit should be 30 players
- The players sit around a table with the facilitator
- For each level, the respective icons are selected and put icon-side up in the table

**Playing the Game:**

1. For each category the facilitator defines a group with players; each group should consist of one player minimum, with up to 5 players maximum
2. The facilitator chooses a category for each group and picks 10 cards from the respective category for the group
   The icons selected for the game are restricted to the icon of each level
3. Each group has 5 minutes to internally discuss the icons and to create a planning concept, which needs to include 5 out of the 10 icons
4. The concepts are the presented in a short statement by each group to the other groups and the facilitator going around in a circle
5. The game pursues with a second round of group work – the facilitator defines two groups that are working together to develop a joint concept made up of their selected five icons, this time focu-sing on the synergies between icons and categories
6. The groups get 5 minutes to negotiate on which icons to use and which concept to develop
7. The teams present their work to each other

**Winner:**

- The winner – the team with the most convincing concept - is selected by vote



# DESIGN YOUR INDUSTRIAL PARK

## *LEVEL 3 ONLY AND NO WINNER*



**Objective:**

- Take different roles and views of stakeholders involved in the planning of Industrial Parks and understand the priorities of stakeholders
- Negotiate and compromise with your team members and develop a concept for an Industrial Park, prepare a combined vision and present to the group

**Setup:**

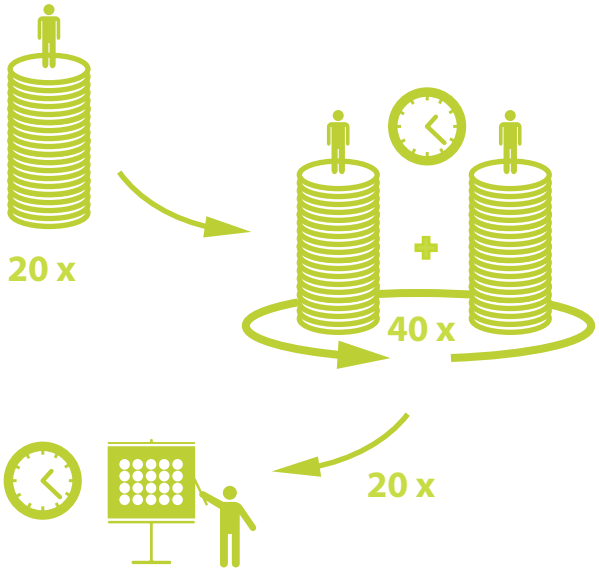
- Between 6 (playing individually) or 24 (playing in 6 team with 4 persons maximum) gather around a table
- All cards (Level 1-3) and all magnetic cards around are arranged at the table icon side up

**Rules of Play:**

1. From the six target groups the players around the table are given an individual role by the facilitator:

- Policy Maker (e.g. Mayor, Governor etc.)
- Investor and Developer (e.g. Industrial Association)
- Bank and Financial Institution
- Industrial Production (from Manager to Blue Collar Worker)
- Urban Planner/Architect (either private/public)
- Environmental Consultant

2. Each player or team can pick 20 cards, she or he believes are important for the design of an Industrial Park from the perspective of his role. The facilitator sets a time and calls for an end if he thinks time is appropriate
3. The facilitator then assigns two parties to play together. The combination should reflect real-life situations aiming at creating groups that might regularly negotiate when planning Industrial Parks
4. In a phase of group work the teams to discuss their ideal Industrial Park by choosing 20 cards out of the available 40 cards. Team members negotiate and trade cards
5. After the 20 park features are chosen the team applies the magnetic cards on a plan of a generic Industrial Park
6. The facilitator should observe the group and set a time for them to assemble their 'Industrial District Plans' from the cards available
7. When the time is up and all groups have collected their cards, each group should present their vision. Players should explain why they have chosen cards but also why they decided to discard icons



# INDUSTRIAL POKER

**Objective:**

Learn about the different sustainability concepts, costs and impacts related to technologies and concepts and identify synergies across categories.

**Setup:**

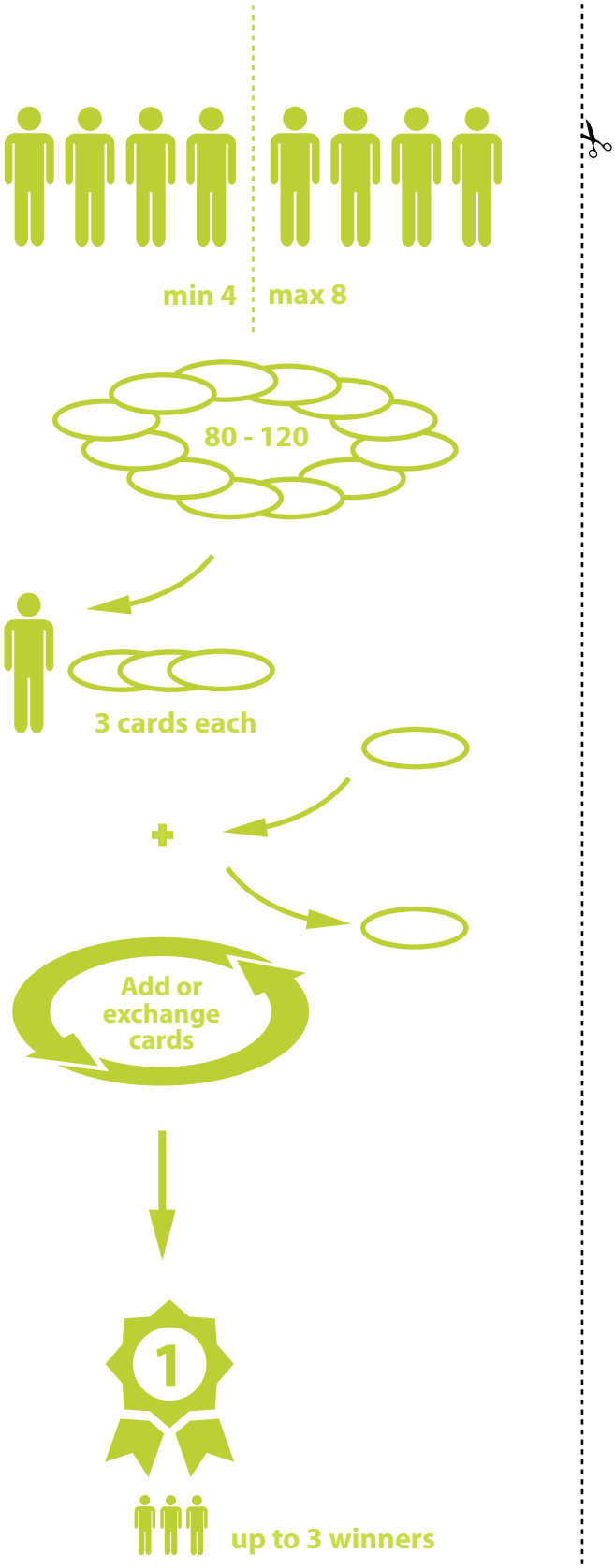
- Between 4 and 8 players sit around a table
- Between 80 to 120 cards around are arranged icon side-up on the table
- The players sit around a table with the facilitator
- For each level, the respective icons are selected and put icon-side up in the table

**Rules of Play:**

1. Each player are dealt 3 random cards as a starter hand by the facilitator
2. The first player can pick any card out of the selection on the table (growing their hand by 1) or to trade a card (keeping their hand the same size, but discarding an unwanted card in exchange for the new card)
3. The game then moves clockwise among players
4. The other players pick cards as long as they have 6 cards in the hand. After a player has this many cards, only trades are permitted
5. The game will continue until a player feels that they have accomplished all the criteria to call 'Stop'. This includes having:
   - Up to 6 cards with all categories (Levels 1, 2, 3),
   - Having a set of cards with low cost points and maximum input points (Levels 1, 2, 3);
   - Having at least 3 synergies (Level 3 only).
6. After 'Stop', each player will present his or her Industrial District's total cost, total impact and number of synergies (Level 3 only) and the rationale behind it to the group, explaining why they choose the cards that they did, and how their concept may better an Industrial Park

**Winner:**

- The lowest cost points (Levels 1, 2, 3);
- the highest impact points (Levels 1, 2, 3);
- the highest number of synergies (Level 3 only)
- Most likely, 3 different 'winners' will emerge – the player with the highest impact, the player with the lowest cost, and the player with the most synergies (Level 3 only)



BURO HAPPOLD

# INDUSTRIAL DISTRICTS IN INDIA
# BLUE COLLAR GREEN III

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