The Natural Step

自然之道

A CIRCULAR ECONOMY CASE STUDY FROM A PROJECT WITH A CHINESE GARMENT MAKER

STOCKHOLM – MILAN – EINDHOVEN – OTTAWA – VANCOUVER – HELSINKI – TEL AVIV – LISBON – ROME – AMSTERDAM – HONG KONG – CHRISTCHURCH – BRISTOL – FINDHORN – WINTERTHUR – MUNICH – SHANGHAI – SYDNEY – TOKYO – SAO PAOLO – MAPUTO – NELSON – WAIHEKE – OTTAGO – SNEEK – ALPES COTE D'AZUR

BACKGROUND INTRO

The Natural Step

- Founded in 1989
- The world's first Sustainability Advisory firm
- Teams in 12 countries
- Research alliance
- 1000's of practitioners using shared methods
- Projects on all continents

Catalyzing change

Facilitate collaboration for systems change.

Help organisations get fit for the future.

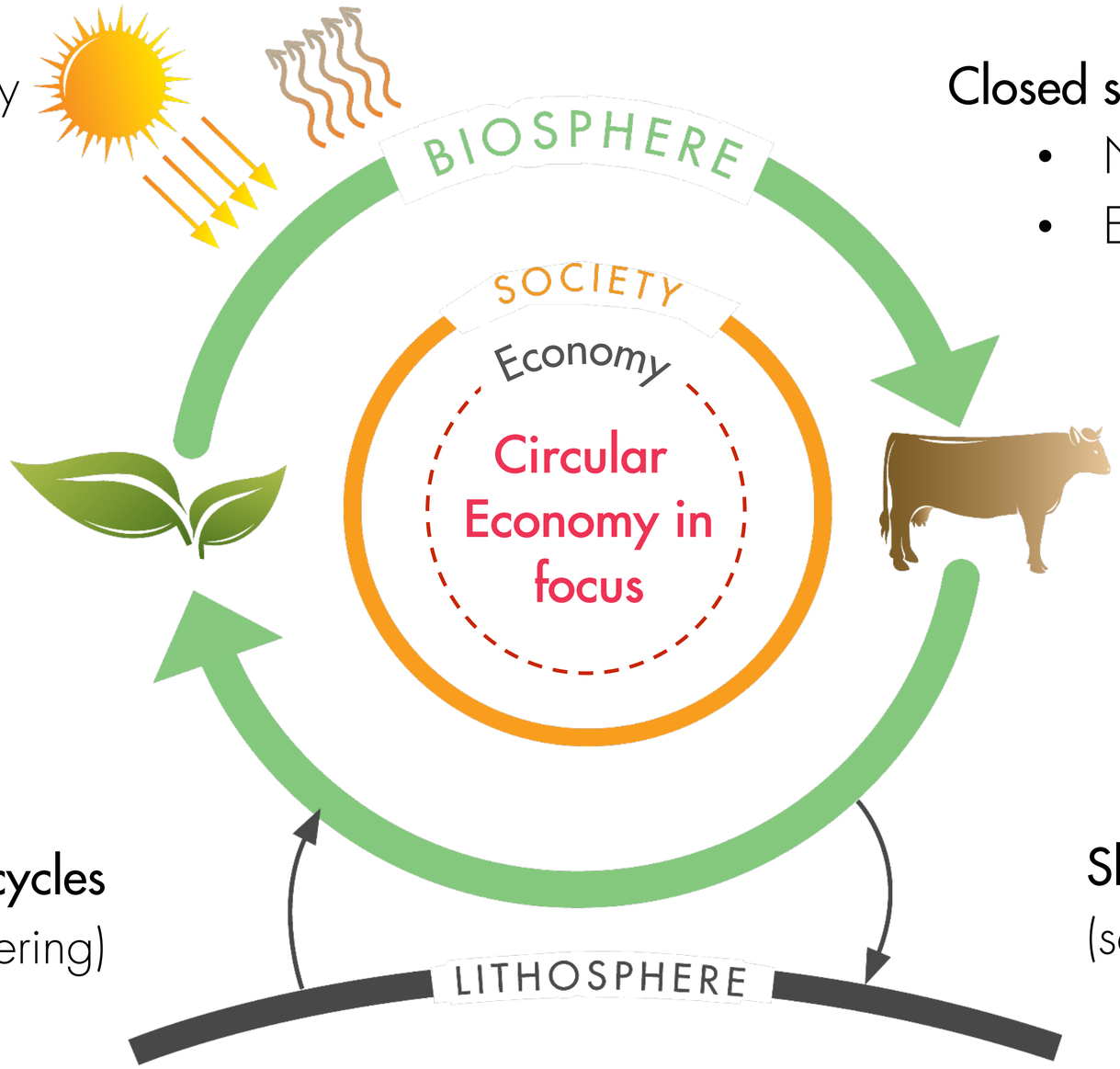
Empower sustainability change-agents.

COACHING TOP COMPANIES SINCE 1990

Open system for energy

Closed system for matter

- Nothing disappears
- Everything disperses



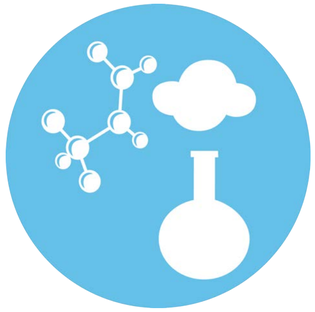
"Photosynthesis pays the bills"

Slow geological cycles
(Volcano eruptions and weathering)

Slow geological cycles
(sedimentation and mineralisati

In a sustainable society…

… nature is not subject to systematically increasing concentrations of substances from the Earth's crust, e.g. heavy metals and fossil fuels.

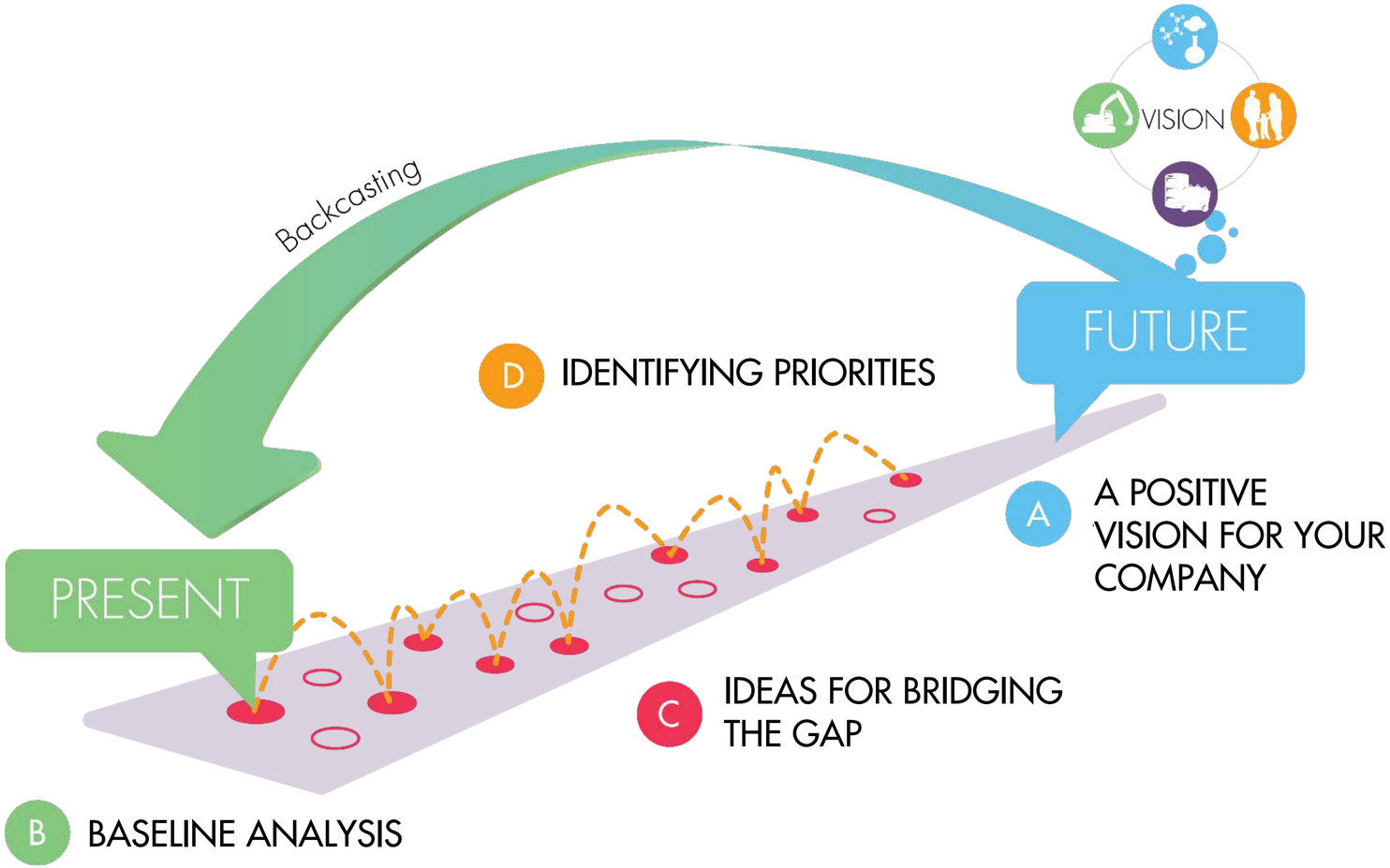


… nature is not subject to systematically increasing concentrations of substances, produced by society, e.g. nitrates and dioxins.

… nature is not subject to systematically increasing degradation by physical means, e.g. overfishing and destroying habitat.

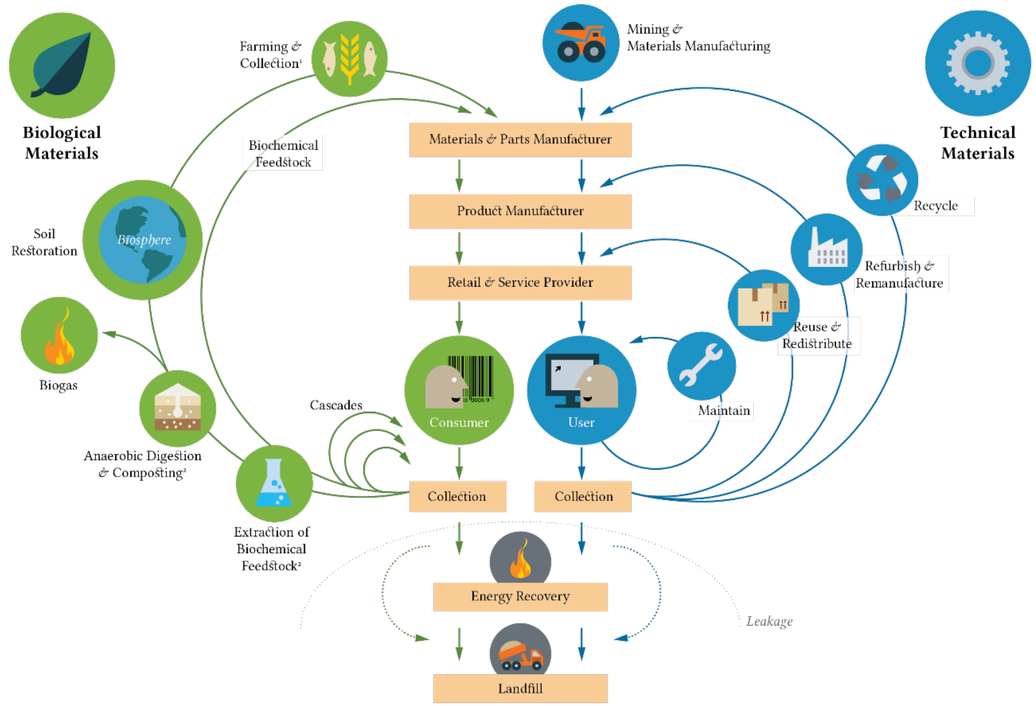
… people are not subject to structural obstacles to health, influence, competence, impartiality and meaning-making.

Planning from success



SCIENTIFIC REQUIREMENTS FOR SUSTAINABILITY

Guideposts for a *sustainable*, Circular economy



CASE STUDY
A LARGE CHINESE GARMENT FACTORY

CHALLENGES IN FASHION INDUSTRY

- Lots of people engaging
- Polluting
- Linear model, wasteful
- Over capacity
- Cheaper and cheaper
- Faster and faster
- Consumer awareness increasing
- Inertia from old system
- …

1/6

in perhaps the biggest industry on the earth
也许是地球上最大的产业

Total Production Volume

At most 1/3 sold to customers	At least 2/3 over-produced

OUR CLIENT Company X PRODUCES APPROX. 100 MIO. PIECES OF KINTTING WEAR IN 8 FACTORIES ACROSS 5 LOCATIONS

- **1 factory in Myanmar**
- 750 workers
- 14 production lines
- New factory in planning
- Output 500k pcs /month

- **2 factories in Cambodia now**
- 30 production lines
- 2000+ workers
- Output 21 million pieces (simpler items than in China)
- 80% of volume for H&M

- HQ in Ningbo
- 5000 workers
- **3 factories in China**
  - 2 in Ningbo with output 30 million pieces
  - 1 in Anhui (sports and action wear) with output of 25 million pieces
- Knitting & dying outsourced
- All fabrics produced in China then sent to Cambodia and Myanmar for cutting, sewing (leadtime from China to Vietnam & Cambodia 2 weeks, to Myanmar 3 weeks)

- **1 Kitting mill under construction in Vietnam**, will be ready in 2017
- 1 sewing factory in planning

Example of garment maker on entire value chain

纤维→ 织布→ 印染→
fiber→ knitting→ dying→

成衣厂Garment maker

测试
test

验布
inspection

醒布 rest/
预缩 pre-
shrink

水洗、顶珠、烂花、加砂等等

裁剪cutting

验片
pieces
checking

印绣花
printing/embroidery

出运
shipping

客检 brand
inspection

包装
packaging

缝制 sewing

大烫
ironing

品检 QC

小烫
Partial ironing

运输/分销→ 零售→ 使用→ 用后
Distribution→
retailing → use→
end of use

15% 织造备纱
Yarn backup

5-10% 面料备次
Fabric backup

75% 裁成率
utilizing rate

3 YEARS OF FULL-SCOPE SUSTAINABILITY PROJECTS

2015

SPARK

- Sustainability vision & strategy workshop
- Middle management sustainability training
- Setting up the sustainability function
- Baselining on pilot site, measurement on impacts, quick wins on water, energy, waste, Co2
- Designed Supplier Management Program (Quality, Price, Delivery, Sustainability)

2016

ENGAGE

- Baseline and quick wins roll-out (Group wide)
- Strategy, IPM, KPI Dashboard development
- Initiate and support ERP and other IT system developments
- Supplier Management Implementation
- Solar invest pilot pre-study

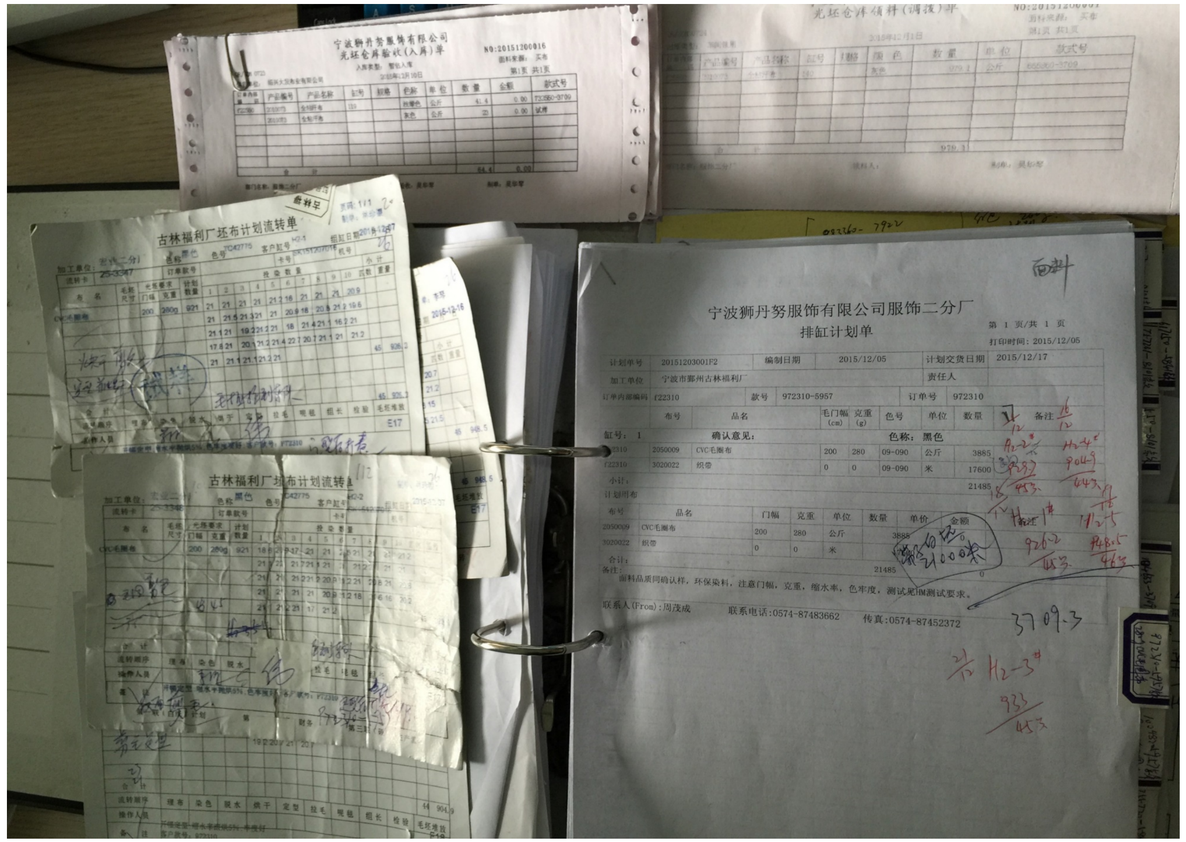
2017

LEAP

- Energy and water target setting & internal improvements projects (Group wide)
- Supplier management further improve & supplier co-evolution project design
- Renewable energy strategy and pilot implementation
- Closing loop pilot on thread holder/cutting wastage/fabric holder (ecosystem design and pilot)
- Social sustainability strategy & actions
- Communication plan & long term sustainability strategy
- Continuous IT & ERP system development support

REQUIRED DATA WASN'T CAPTURED IN A FORMS-BASED WORKING ENVIRONMENT. WE INITIATED IT DEVELOPMENT WITH QUICK WINS OF OVER 2mio RMB

Fabric warehouse entry management



- 70's Warehouse management, everything on paper
- Even hard to find expected delivery time to compare against
- Too much manual work to convert those historical date into excel

AFTER DOING BASELINING ANALYSIS ON DIFFERENT DIMENTIONS AND CONDUCTING IMPROVEMENT ACTIVITIES, OVER 2 MILLION RMB HAS BEEN SAVED

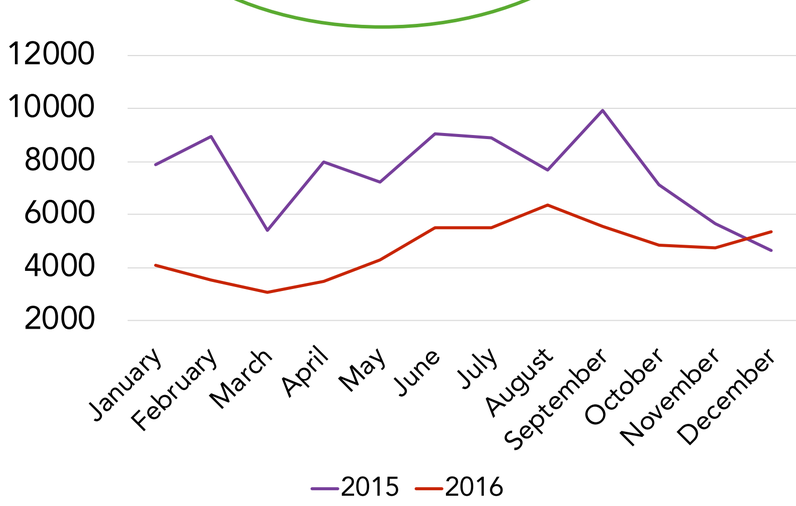
2015-2016

- Baselining on different sustainable impact areas for domestic three sites.
- Analyzed data, compared between three sites and the last two years within one site to find improvable areas.
- Came up with improvement activities and implemented with local teams.

2016 monetary savings of three domestic sites from efficiency improvement activities

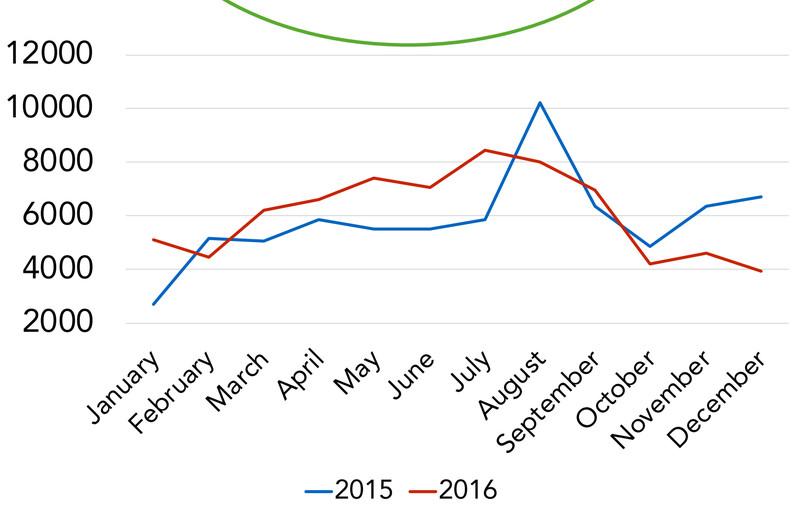
Water

0.64M RMB/year



Electricity

1.56M RMB/year



ROOT CAUSE ANAYSIS OF OVERTIME REVEALED A FEW KEY DRIVERS AMONG WHICH PLANNING AND SUPPLIER MANAGEMENT HAVE THE HIGHEST IMPACT

Factors that may influence OT and stop order

1. Order volume/ mix
2. Production planning
3. Capacity utilization
4. Staff desire to earn more money
5. Staff turnover/absence
6. Productivity
7. Quality
8. Lead-time
9. Material availability
10. Equipment availability (breakdowns)

Our research findings

1. Production planning can be improved
2. Capability of IT systems has not kept pace with Company X's growth
3. Capacity visibility and load balancing between factories can be improved
4. Supplier management can be significantly improved and would be the easiest and fastest way to reduce overtime
   - Approx. 50% of stop orders are caused by supplier issues (poor delivery precision, poor quality)
   - A significant number of all material received from suppliers fail quality tests by Company X's test center
   - More often than not, suppliers deliver too late

Company X HAS 229 SUPPLIERS IN THE 9 CATEGORIES
狮丹努拥有9大分类共229个供应商

Supplier Category 供应商类别	Qty 数量
面料 Fabric	81
棉纱 Yarn	14
织造 Knitting	13
染色 Dyeing	6
绣花 Embroidery	14
印花 Printing	6
水洗 Washing	1
辅料 Accessory	92
运输 Transportation	2









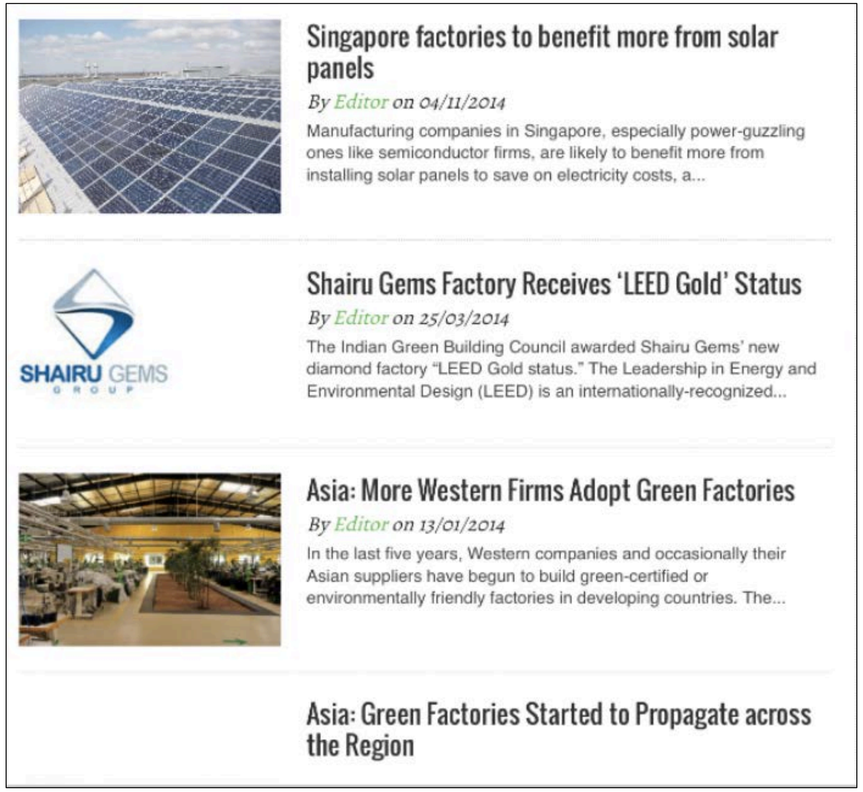
Company X SUPPLIER MANAGEMENT PROCESS
狮丹努供应商管理流程

FOUR ASPECTS BASIS OF SUPPLIER ASSESSMENT
供应商评估四方面依据

Supplier Category 供应商类型	Cost 成本	*Quality* 质量	*Delivery* 准期率	*Sustainability* 可持续发展
Fabric 面料	Compare between different suppliers' quoting 各供应商报价之间横向比较	Delivered fabric gram weight and width testing results 面料到货的克重门幅测量结果 Fabric inspection results 验布记录 Company X lab testing results 狮丹努实验室测试结果 Cutting workshop pieces checking results裁剪车间捡片记录 Clients testing results of fabric quality 客户检验中提到面料质量的结果 Clients complaints results about fabric 客户投诉面料的结果 Defective rate of fabric 工厂产品面料问题次品率	Deviation between actual delivery date and required delivery date 实际到达日期与要求到达日期的偏差	Sign in ethical code of conduct 签署道德行为准则 Company X sustainability questionnaire scoring 狮丹努可持续问卷打分 Extra scores for R&D capacity, testing center and renewable energy. 对研发能力、测试中心、可再生能源等的额外分数
Yarn 纱		Company X lab testing results 实验室测试结果 Random gram weight measurement 随机克重检测		
Knitting/ Dyeing 织造、染色		Visual inspection (USA standard 4 score-including gram weight) 视觉检查（美标4分-包括克重） Company X lab testing results 实验室检测结果		
Printing/ Embroidery 印绣花		Pieces returning rate 衣片返回率 Lab testing results 实验室检测结果		
Accessory 辅料		Visual inspection 视觉检查 Lab testing results 实验室检测结果		

RENEWABLES TREND AND INCREASINGLY ATTRACIVE PRICING LED TO PR E-STUDY

Global trend towards "green factories"



Singapore factories to benefit more from solar panels

By Editor on 04/11/2014

Manufacturing companies in Singapore, especially power-guzzling ones like semiconductor firms, are likely to benefit more from installing solar panels to save on electricity costs, a...

Shairu Gems Factory Receives 'LEED Gold' Status

By Editor on 25/03/2014

The Indian Green Building Council awarded Shairu Gems' new diamond factory "LEED Gold status." The Leadership in Energy and Environmental Design (LEED) is an internationally-recognized...

Asia: More Western Firms Adopt Green Factories

By Editor on 13/01/2014

In the last five years, Western companies and occasionally their Asian suppliers have begun to build green-certified or environmentally friendly factories in developing countries. The...

Asia: Green Factories Started to Propagate across the Region

Source: Google searches

Renewables is a key H&M focus area

"…in 2015, we reduced our total e-missions ….The main reason for this is our heavily increased use of renewable electricity.

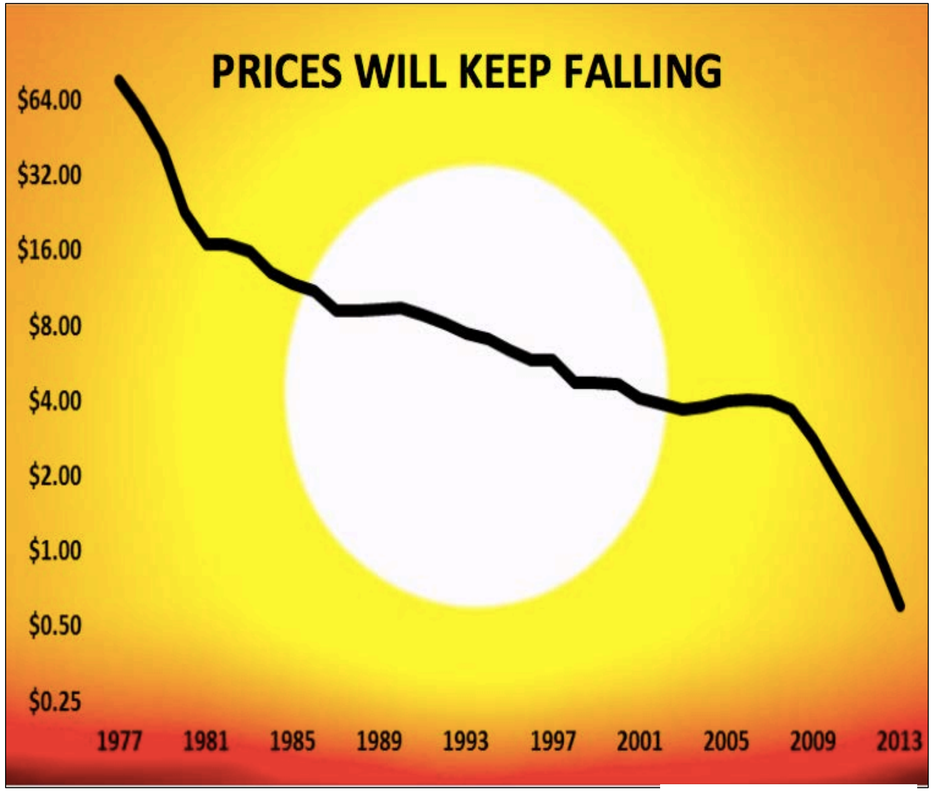
…Moving towards 100% renewable electricity…

…We will continue to focus on keeping our emissions as minimal as possible by further increasing our use of renewable electricity,

…Moreover, we will focus our efforts on promoting reduced climate impacts along our value chain."

Source: H&M conscious actions sustainability report 2015

Solar is on an exponential curve and is now cheaper than coal in many places



Source: Ramez Naam, Singularity University

IN GENERAL, THERE ARE 3 BASIC OPTIONS: SELF INVEST, POWER PURCHASE AGREEMENT & LEASE WHICH HAVE DIFFERENT PRO'S AND CON'S

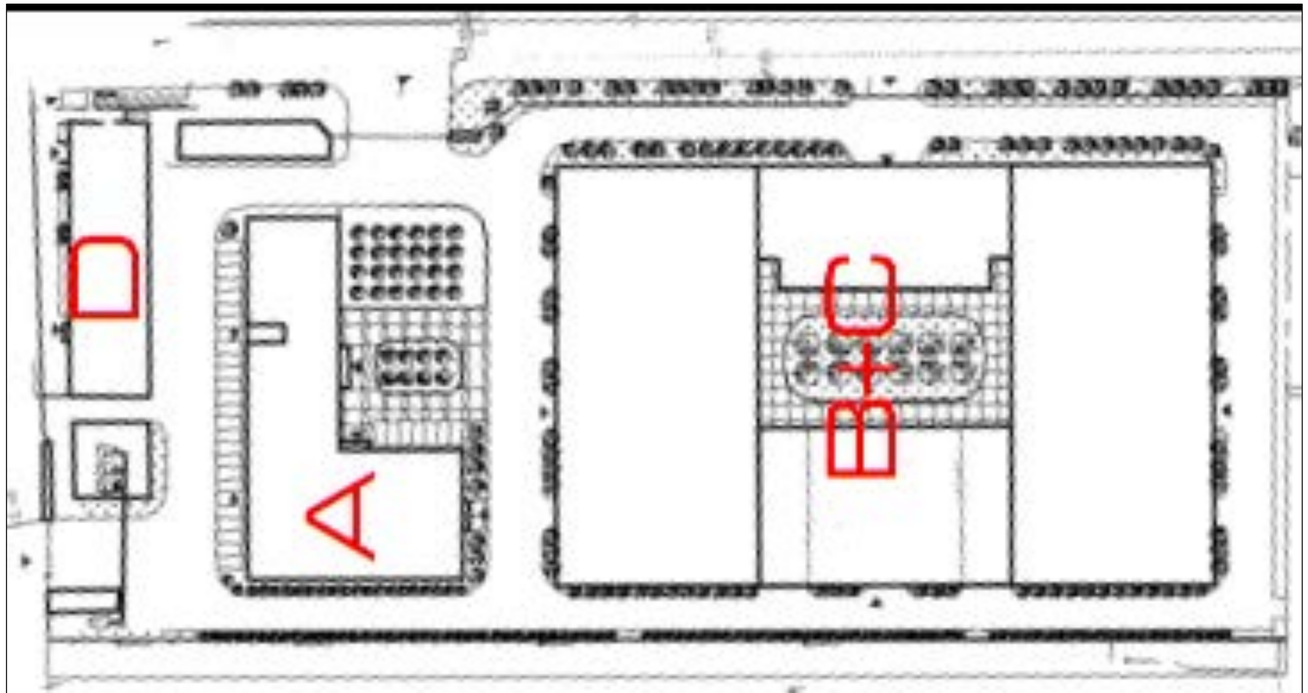
OPTIONS:	PRO's:	CON's:
SELF INVEST	• Larger annual savings • Close to free electricity for 15+ years • Potential tax credits or subsidies • Solar panels improves capacity and drops in price every year favoring staged roll-out	• Upfront investment • 6-7 year payback before any savings • Have to pay for maintenance and repair yourself
PPA	• No upfront investment • Guaranteed energy cost reduction of 10% • Managed service	• Cannot take advantage of falling solar panel cost or tax subsidies • Long lock-in period (25 years) • Financial risk if move or sell building
LEASE	• No upfront investment • Can use own generated solar to reduce dependency on grid and to reduce cost	• Same as for PPA + • No managed service e.g have to pay for maintenance and repair, and monitoring/calculating and possible re-selling excess capacity yourself

Company X'S LONGSAN SITE WAS CHOSEN FOR FEASIBILITY STUDY AND CONTAINS 3 MAIN STRUCTURES, A /(B+C)/D

Office, 1800 sqm

Factory, 9300 sqm

Dorm, 860 sqm



Company X PLANS TO MAKE FIRST INSTALLATION IN 2017 AND AIM TO BE CLIMATE NEUTRAL BY 2030

TIMELINE UP UNTIL 2018 AND VISION FOR 2035 (DRAFT):

TNS introduces Solar rooftop as investment case to Company X

Search for vendors begins. First energy efficiency improvement measures under way.

H&M Global Supplier Day

H&M invites Company X to present their Solar pre-study as "best practice case"

Vendor 3 conducts rooftop assessment

Also proposes "floor" mounting. Flexible options includes PPA.

Approval/adoption of renewable energy strategy and go ahead with 1st Pilot rooftop implementation

Tentative date for Company X to go ahead with 1st rooftop solar implementation (Longsan Site)

All Company X sites generates >50% from renewable energy

Offsetting of remaining 50% has begun

Energy efficiency projects has reduced energy consumption per piece by at least 15%. Relative to base year 2015

Climate Positive

Company X obtains all its electricity needs from renewable sources. Offsetting is used to become climate positive

TNS/Company X begins collaborating

Pre-study begins: Vendor 1 conducts rooftop assessment

They propose 3 alternatives. "Elevated" mounting alternative comes with >7year payback .Views scales as too small for PPA. Company X hesitates and ask TNS to find alternative vendors

Vendor 2 conducts rooftop assessment

Proposes floor mounting. Better payback period but TNS and Company X questions the "honesty". No PPA at this scale.

Start drafting Renewable Energy Strategy

TNS together with Company X Sustainability team begins to develop a Renewable Energy (Solar, Wind and other) Strategy including research into different offsetting mechanisms. The team also presents a business case for rooftop solar 1st investment to Company X's top management team.

Evaluation of 1st Pilot and go-no-go for 2nd rooftop implementation

Review of results from 1st pilot vs. the "promised" business case and decision regarding where, when and how to implement 2nd solar roof

Climate Neutral

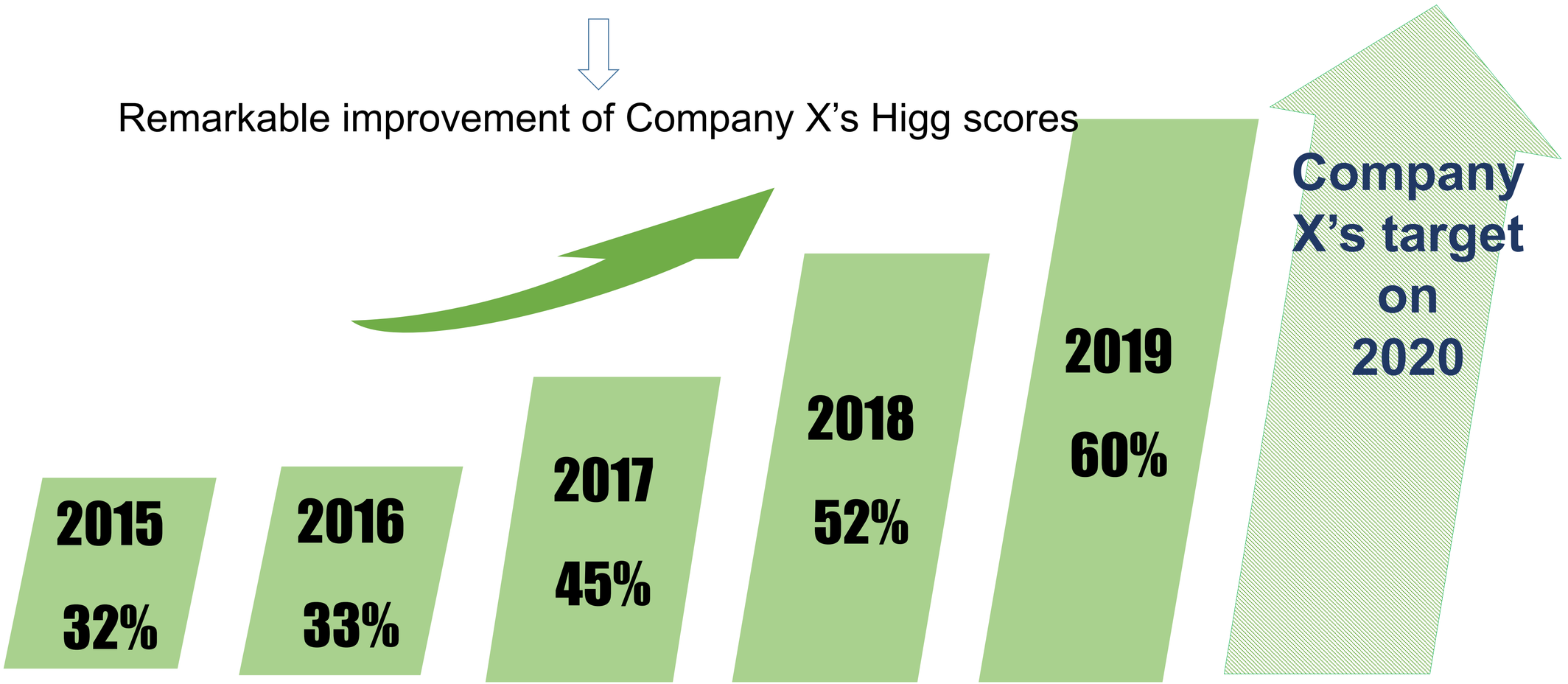
A majority of its electricity consumption comes from renewable sources. The remaining is completely offset.

HIGG指数

HIGG IMPROVEMENT PLAN

Cooperated with TNS since 2015

Remarkable improvement of Company X’s Higg scores



CIRCULAR ECONOMY

WASTE FROM GARMENT MAKING

What type of waste a garment maker will have?

狮丹努废料种类

Fabric waste 面料废料

Cutting waste 裁剪废料

Sewing waste 缝纫废料

Plastic waste 塑料废料

Hangers 衣服挂

Sewing thread holder 线壳

Cardboard waste 纸壳废料

Cardboard Box 纸壳箱

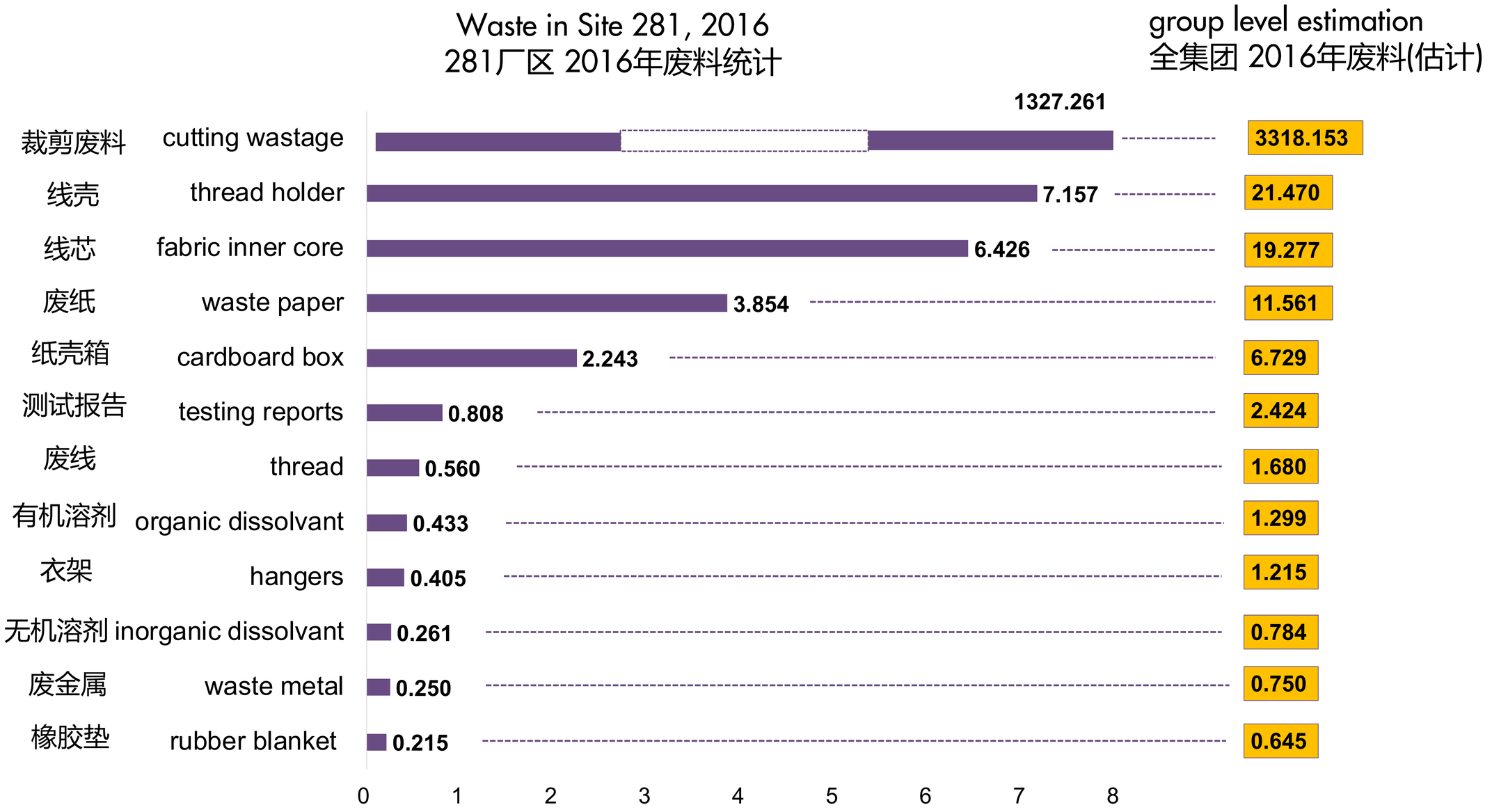
Fabric inner core 面芯

Metal waste 金属废料

Scissor 剪刀

Cutting blade 裁剪刀片

WASTE PER TYPE OF WASTE 2016 (ton)
2016年废料总量（吨）



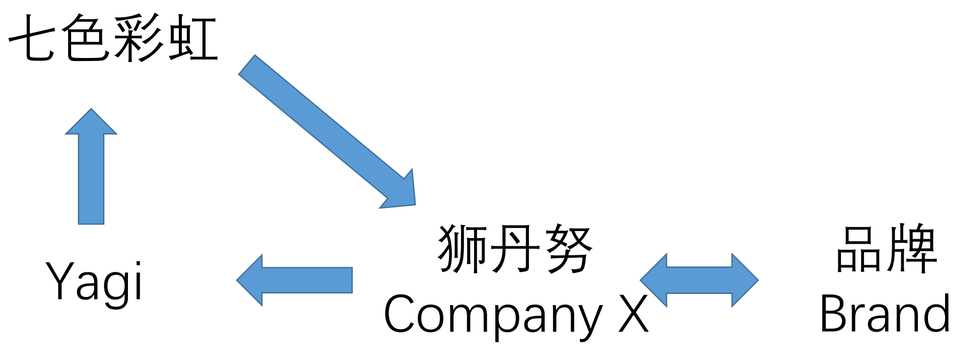
WASTE FROM TEXTILE INDUSTRY IS NOT ONLY TEXTILE

仅纤维一项，保守估计，只有50%的纤维/面料成了最终成衣

Estimated loss of fiber/fabric is around 50% when a garment is made

面料回用环/ FABRIC CLOSED LOOP

封闭型面料回用环/ Closed Loop



开放型面料回用环/ Open Loop

Thank you.

Patrik Sandin, Chairman
The Natural Step International
patrik.sandin@thenaturalstep.org
+86 186 2069 8850