

Sino-German Collaboration to Improve the Energy Efficiency of Buildings in Urumqi

中德合作提高乌市建筑能效

A project of RECAST Urumqi - RECAST 乌鲁木齐项目

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Sino-German Workshop on Energy Conservation, Urumqi, January 2007

2007年1月在乌鲁木齐举办的首届中德建筑节能高层研讨会

Energy Conservation in Residences and Public Buildings

- 12 Presentations from German & Chinese Experts
- Participation of many Urumqi stakeholders
- Simultaneous translation allowed for open exchange and candid discussions
- Media coverage, similar format planned for future project meetings
- Papers available at www.ifeu.de



民用建筑和公共建筑的节能

- 12位中德专家做了报告
- 与会者包括乌鲁木齐各方合作伙伴
- 同声传译使得与会者可以自由交流和公开讨论
- 技术支持和媒体报道，为远期项目会议提供了参考依据
- 在研究所网站上可以下载相关报告 www.ifeu.de

Sino-German Workshop on Planning for Low Energy Buildings, March 2009

2009年3月在德国海德堡成功举办了中德低能耗建筑规划的专业研讨会

- One week of workshop and excursions 为时一个星期的研讨会和参观
- Excursions to passive house projects in the region of Frankfurt
参观法兰克福被动式建筑项目
- Establishing a mutual understanding of standards and goals
交流理解双方的节能标准和目标
- Identification of future areas of collaboration 确认未来合作的领域

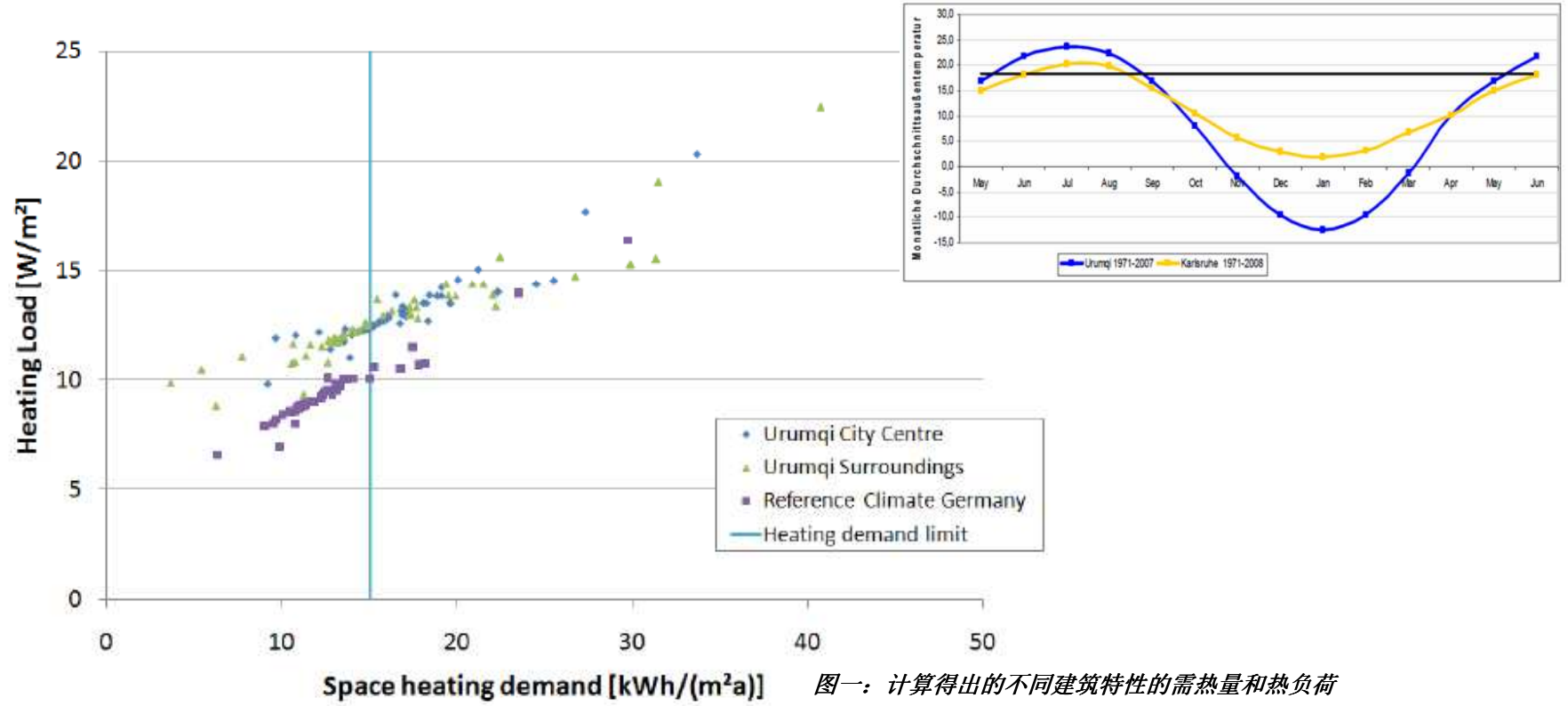
Case study: Passive house school in Frankfurt-Riedberg
参观法兰克福Riedberg被动式标准的学校建筑





Passivehouse Institute Darmstadt concludes:
Though heating energy demand in Urumqi is
about 100% higher than in Karlsruhe ...

达姆施塔特被动式建筑研究所得结论：乌鲁木齐供热能耗高于卡
尔斯鲁厄近100%



图一：计算得出的不同建筑特性的需热量和热负荷

...that it is possible to achieve the Passive House Standard
(15 kWh/m2*a) in Urumqi as well!

在乌鲁木齐可以实现被动式建筑标准(15 kWh/m2*a)



Lighthouse Projects Low Energy Building: Sino-German Collaboration 中德合作低能耗建筑示范项目

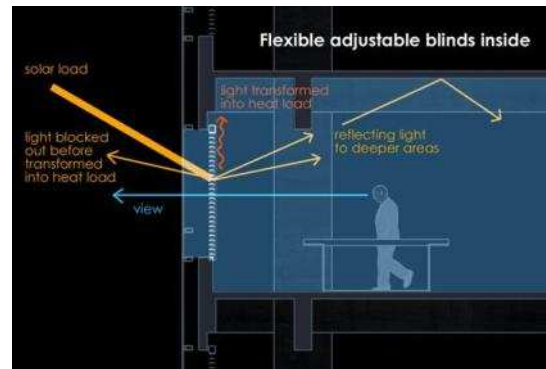
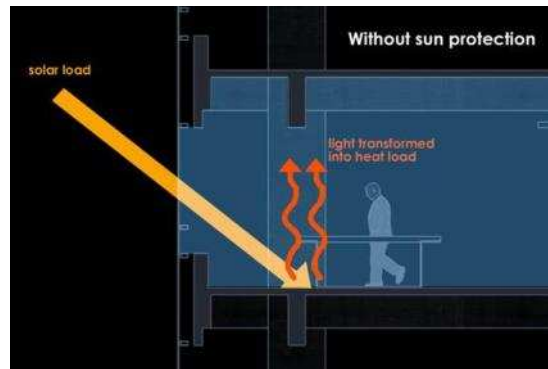
- Recommendations to improve energy efficiency and indoor climate in Dacheng International high-rise, April 2009
大成国际写字楼提高能效和室内环境质量的建议，2009年4月
- Sustainable Prototypes for the Development for the Dryland Megacity Urumqi
干旱地区大城市乌鲁木齐的可持续发展
- Planning of renovation of the Nanshan conference center of the Construction Committee to near-passive house standard, November 2009 – October 2010
乌市建委培训中心近被动式建筑标准改造项目，2009年11月-2010年10月
- Planning of the Xingfu Rd. Mixed-Use building to near-passive house standard, start November 2009
规划幸福路新建近被动式建筑标准多功能建筑，2009年11月开始

Recommendations to improve energy efficiency and indoor climate in Dacheng International high-rise, April 2009

大成国际写字楼提高能效和室内环境质量的建议，2009年4月

RECAST Urumqi: Energy Efficiency

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Quick-fix proposals for missing heat protection 建筑热保护的快速解决方案



CULTUREBRIDGE ARCHITECTS

Sustainable Prototypes for the Development for the Dryland Megacity Urumqi

干旱地区大城市乌鲁木齐的可持续发展

 CULTUREBRIDGE ARCHITECTS
 文化桥建筑设计有限公司

Nachhaltige Stadtbausteine für die Dryland-Megacity Urumqi

干旱地区大城市乌鲁木齐的城市建设可持续发展



Studie im Rahmen des Projektes RECAST URUMQI im Auftrag des IFEU Institut Heidelberg, gefördert durch das Bundesministerium für Bildung und Forschung (BMBF)
 该研究报告是受海德堡能源与环境研究所之委托的研究成果

108 page booklet available for download at www.ifeu.de
 在ifeu网站上可下载108页的研究报告 www.ifeu.de

General aspects of sustainable city and buildings

可持续城市和基本建筑的观点

Regionalisierung

本地化

Ein Konzept richtig und falsch angewendet 方案的正确和错误应用

Wintergarten 冬季花园
Wohnhaus Deutschland 德国住宅



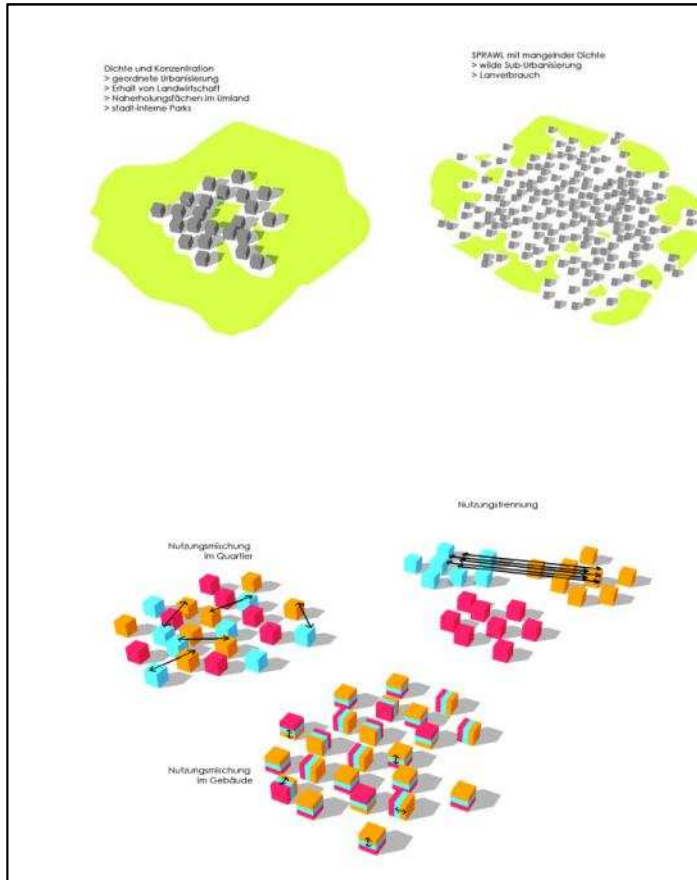
Wintergarten 冬季花园
Bibliothek in Tianjin, China 天津图书馆, 中国



General aspects of sustainable city and buildings

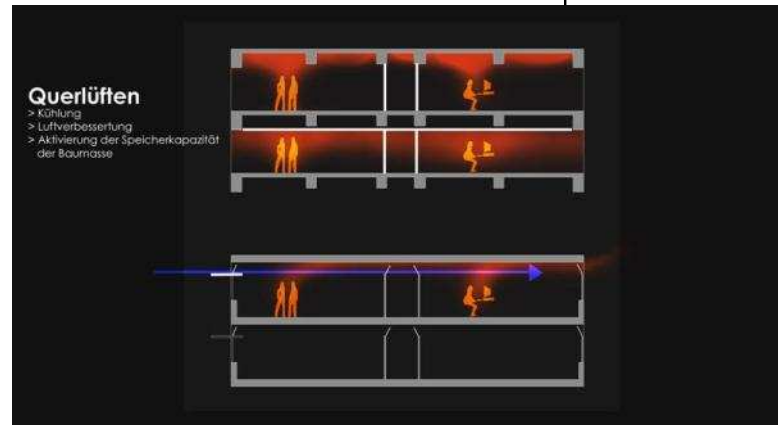
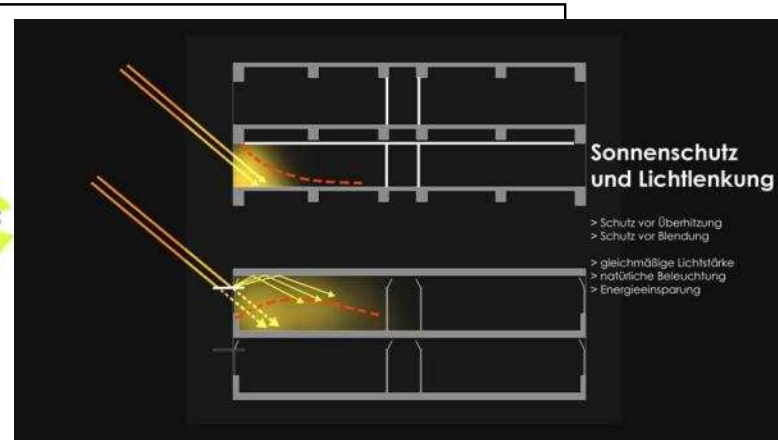
可持续城市和基本建筑的观点

Density against urban sprawl 高密度比较城市扩张



Mixed-use reduces urban traffic 混合使用减少城市交通

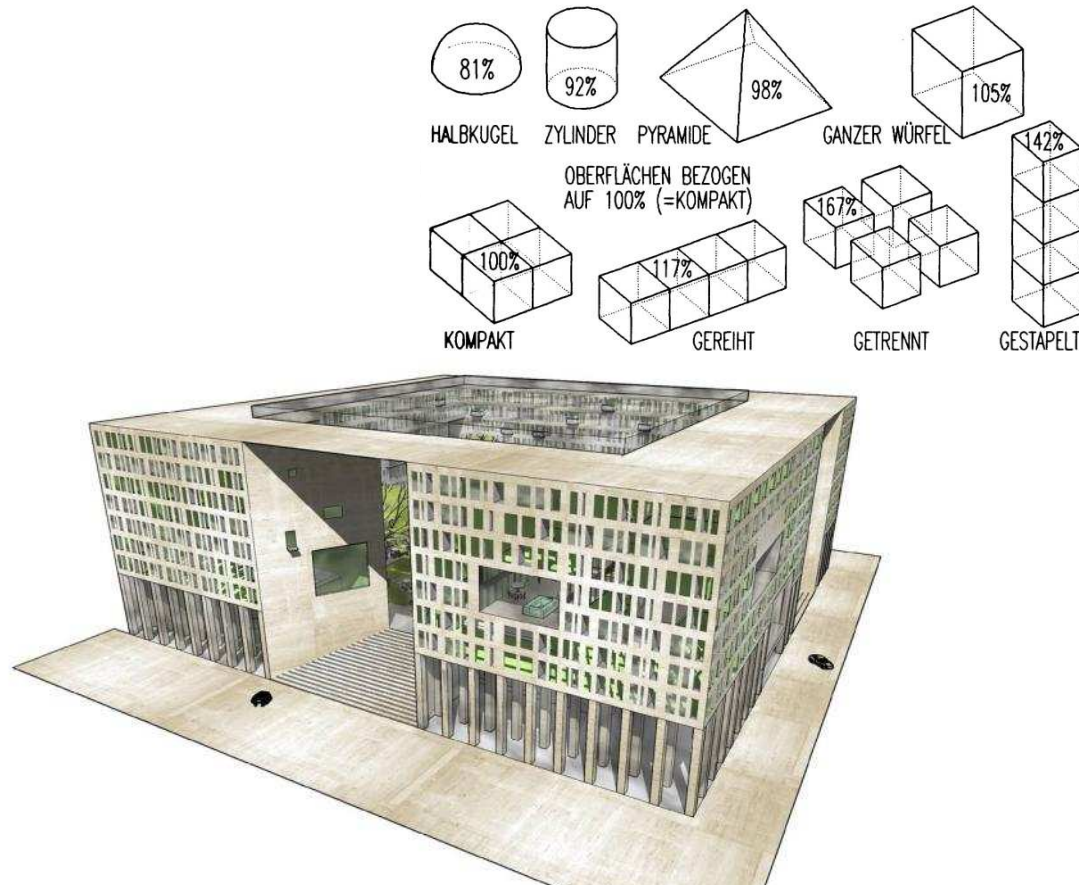
Shading and natural lighting 遮光和自然照明



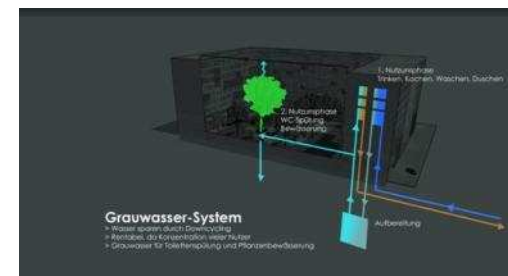
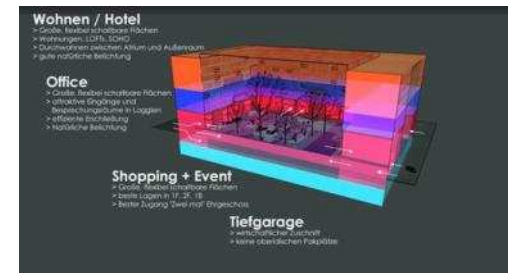
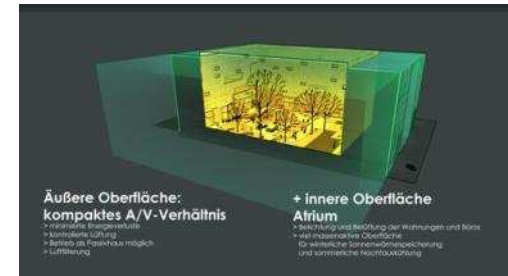
Night-cooling and „activated“ concrete structure 夜间自然通风和有活性的水泥结构

Prototype „Megablock“

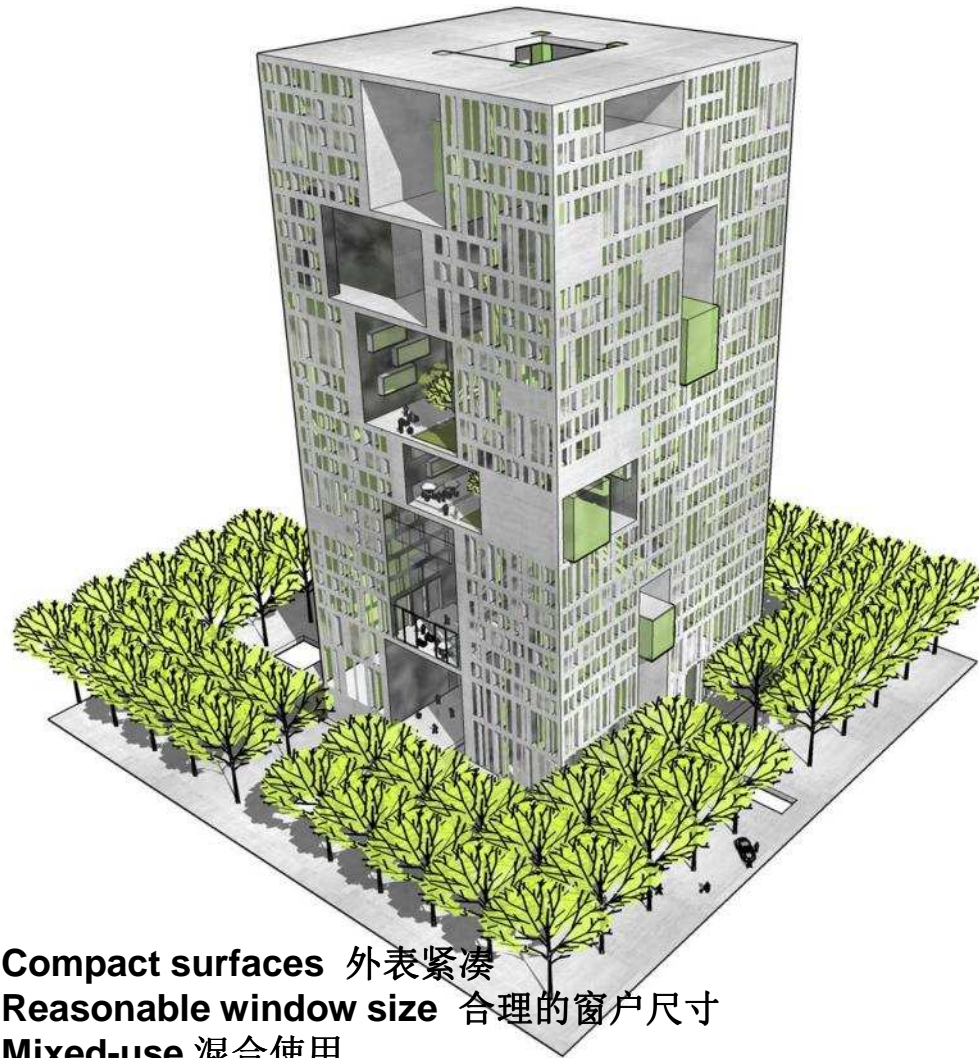
“超级方块”模型



Regional typology: Courtyard 地区性建筑类型: 庭院
 Compact surfaces 外表紧凑
 Mixed-use 混合使用
 Passivehouse 被动式建筑
 Summer heat block-out 夏季热反射
 Grey water treatment 中水处理



Prototype „Vertical City“ “垂直城市”模型



- Compact surfaces 外表紧凑
- Reasonable window size 合理的窗户尺寸
- Mixed-use 混合使用
- Solar chimney 太阳能烟囱效应
- Internal atriums and loggias 内部中庭和走廊

Äußere Oberfläche: kompaktes A/V-Verhältnis

- 1. kompakte Bauweise
- 2. vertikale Lüftung
- 3. helles Innenklima
- 4. Lüftung

Kollektor-Fassade

- 1. Kollektor-Fassade als Solarstrahlensammel- und Wärmespeicher
- 2. Kollektor-Fassade als Solarstrahlensammel- und Wärmespeicher
- 3. Kollektor-Fassade als Solarstrahlensammel- und Wärmespeicher

Office-Turm

- 1. Office-Turm mit vertikalen Flächen
- 2. Aussicht in alle Richtungen
- 3. vertikale Lüftung
- 4. vertikale Lüftung

Wohn-Turm

- 1. vertikale vertikale Flächen
- 2. vertikale vertikale Flächen
- 3. vertikale vertikale Flächen

Shopping + Event

- 1. vertikale vertikale Flächen
- 2. vertikale vertikale Flächen

Solarer Kamin

- 1. Solarer Kamin
- 2. Solarer Kamin

Innere Oberfläche: Atrien- und Loggia-System

- 1. vertikale vertikale Flächen
- 2. vertikale vertikale Flächen

Vertikale Stadt

- 1. vertikale vertikale Flächen
- 2. vertikale vertikale Flächen

Prototype „Low Energy Oasis“

“低能耗绿洲”模型



Regional Typology 地区技术
 High comfort 高舒适度
 Passive warming and cooling 被动式采暖和制冷



Nanshan Training Center – current status

南山培训中心 – 现状

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CULTUREBRIDGE ARCHITECTS

Nanshan – previous concept: 南山初期方案

a focus on „new“ technology and materials on the base of a conventional architectural approach
 焦点在于新技术和材料在传统建筑方法上的应用



Nanshan – simple improvements without high tech

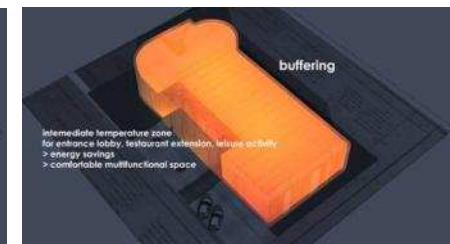
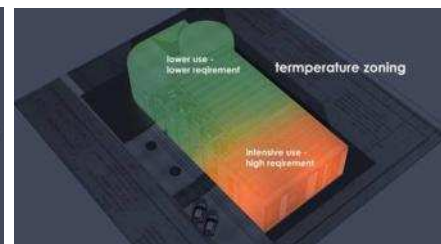
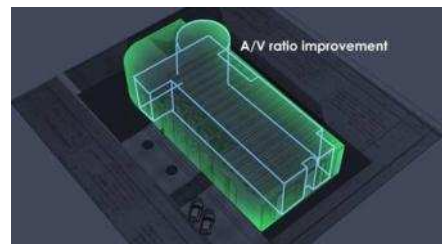
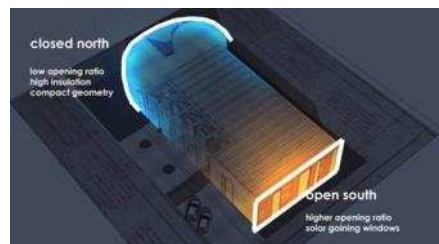
南山 – 无须高科技便可实现改进

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solar orientation, surface ratio, temperature zoning, buffering

太阳朝向，形体系数，温度区域，缓冲区



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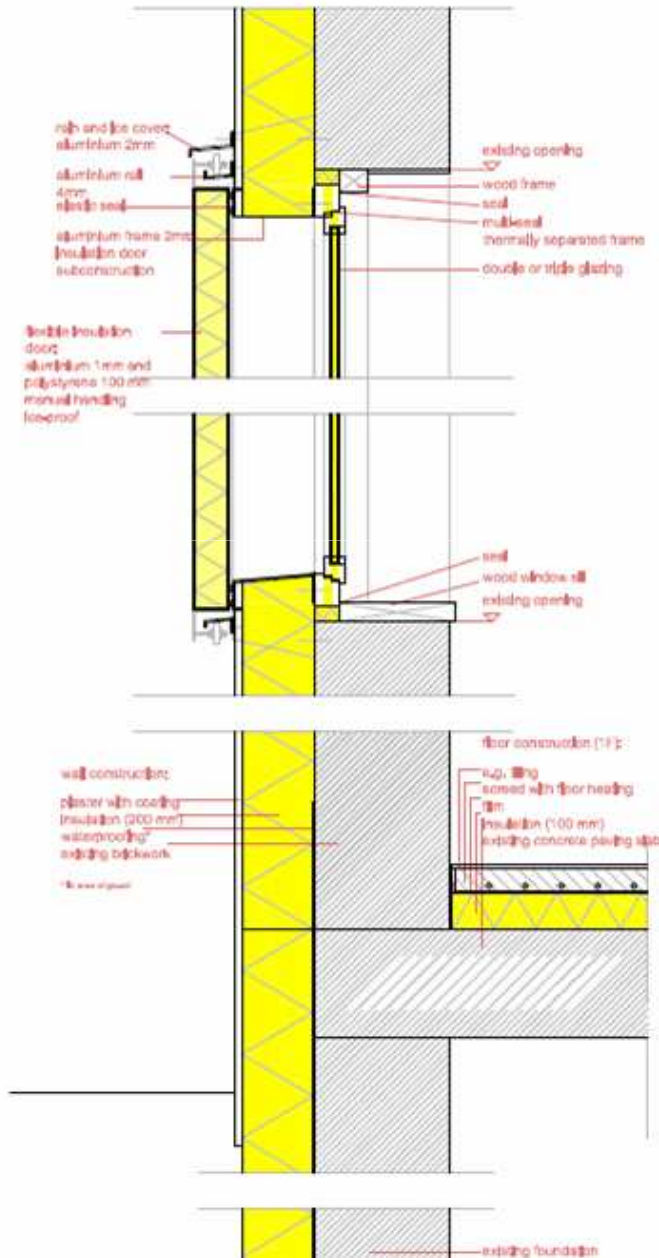
CULTUREBRIDGE ARCHITECTS

Nanshan – wall details and wintergarden view

南山 – 墙体和阳光廊的视图

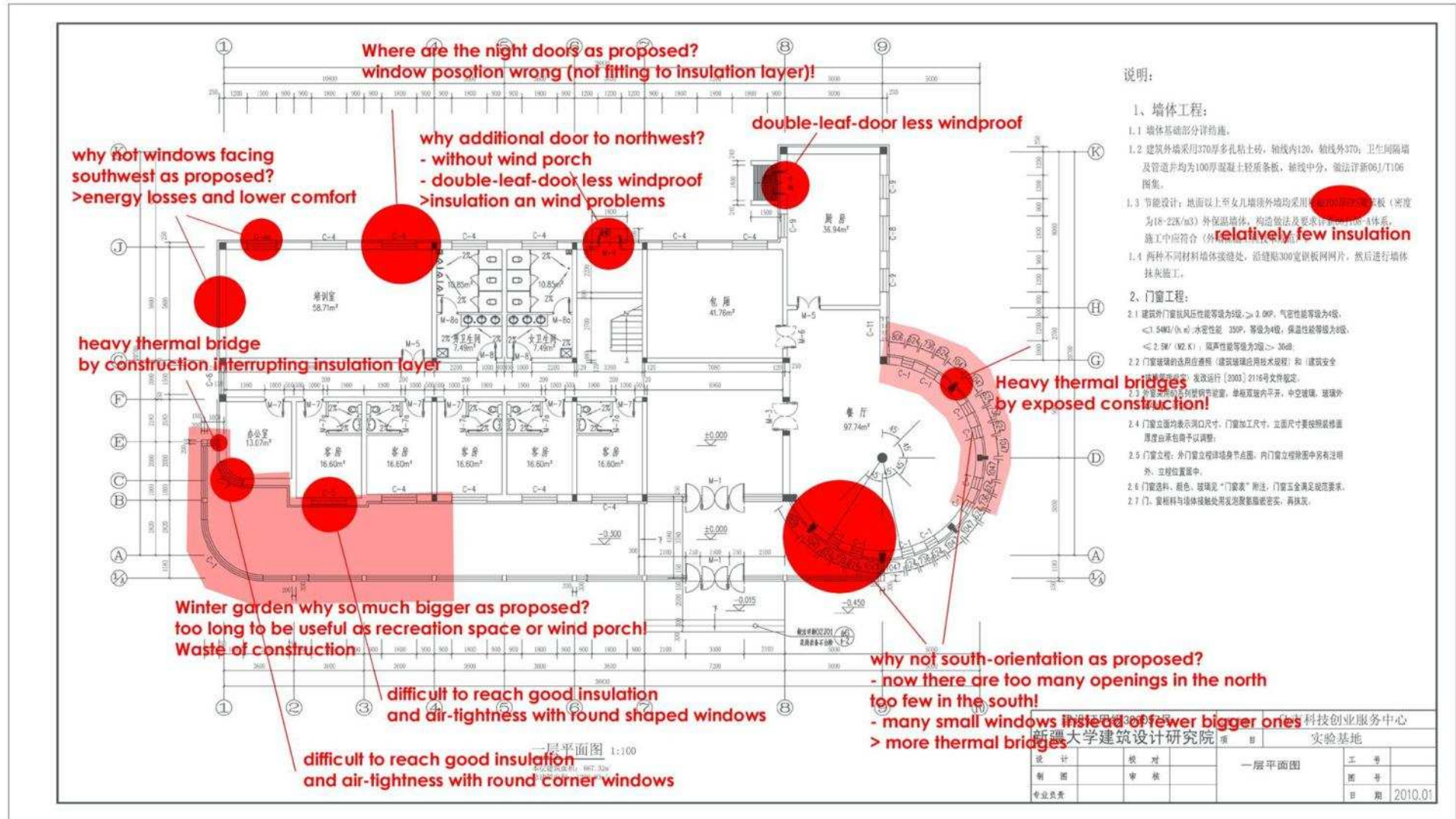
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CULTUREBRIDGE ARCHITECTS

Nanshan - „simple“ improvements 南山 – 简单改进



Nanshan Heat Demand Calculations, kWh/(m²*a)

南山热需求计算

Condition 条件	Prof. Wang, University of Xinjiang 新大王教授	Passive House Institute, Darmstadt 被动式建筑研究所
Current status 现状	306	420
Renovation, no heat recovery 改造, 无热回收	82	77
Renovation with heat recovery 改造, 有热回收	58	
Additional casement windows 复合式窗户		68
- plus better insulation (400 mm) 辅以更好的隔热保温(400mm)		46
- plus heat recovery 辅以热回收		27

- **Reasonable agreement between two calculation methods**
两个计算方法结果基本一致
- **At a minimum, 75% reduction in heat demand will be achieved**
热需求至少减少75%
- **A further reduction is possible- PHI recommendation:**
first raise insulation level, than other technical equipment
更大幅度的减少热需求也可以实现 - 被动式建筑研究所建议: 先提升建筑围护结构水平, 再提升技术设备效率

Nanshan – Cooperation agreement with Construction Committee of the City of Urumqi

南山 – 和乌市建委的合作协议



Project initiated jointly by IFEU Heidelberg and Construction Committee of the City of Urumqi
 该项目由海德堡能源与环境研究所和乌市建委联合发起

Joint planning in cooperation between CULTUREBRIDGE ARCHITECTS and Prof. Wang, University of Xinjiang

参与合作规划各方为文化桥设计公司 and 新疆大学王万江教授



Nanshan – schedule 南山 – 进度表

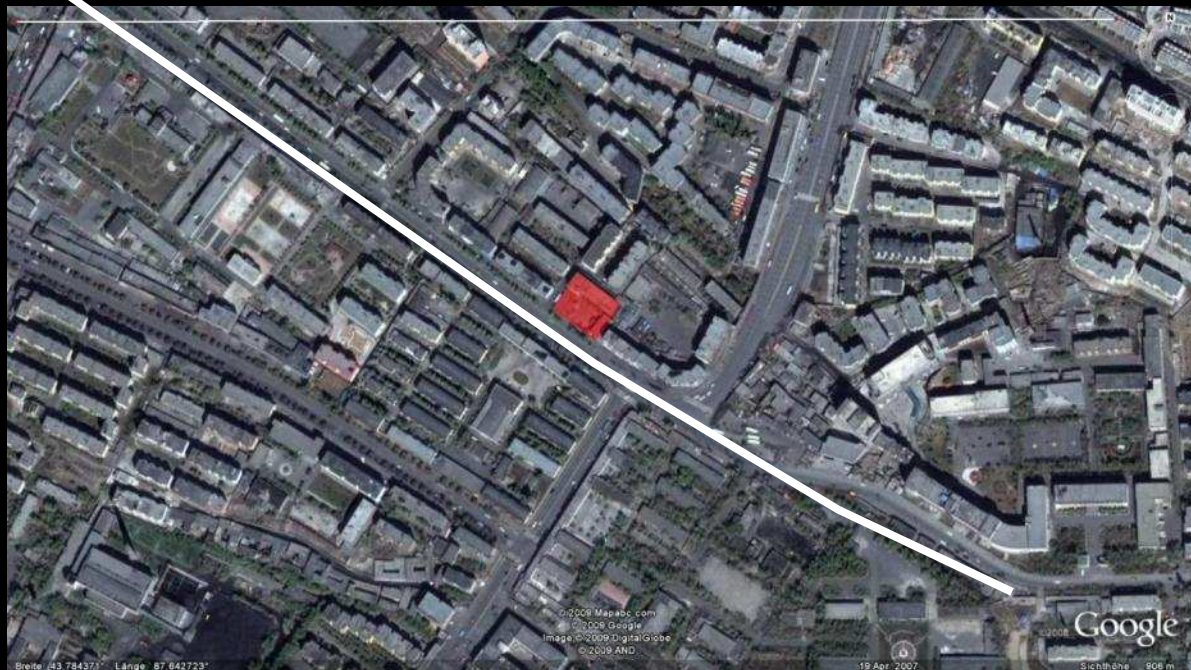
- **Ribbon cutting ceremony in mid-May 2010**
2010年五月中旬开工典礼
- **Project completion in the Fall of 2010**
2010年秋季完工
- **Providing a German and Chinese Energy certificate**
授予中德双方的能源证书
- **Joint analysis of energy demand in practice**
能耗需求分析与实际结合

Xingfu Road – Construction of a Passive House in Urumqi city center

幸福路 – 在乌鲁木齐市中心的建造一幢被动式建筑

RECAST Urumqi: Energy Efficiency

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CULTUREBRIDGE ARCHITECTS

Xingfu Road – Courtyard between old and new building

幸福路 – 在新老建筑中间的中庭设计



Regional courtyard typology, simple structure 本地化中庭结构，结构简单

Xingfu Road – atrium interior 幸福路 – 内部中庭

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Four season public space 四季适宜的公共场所



CULTUREBRIDGE ARCHITECTS

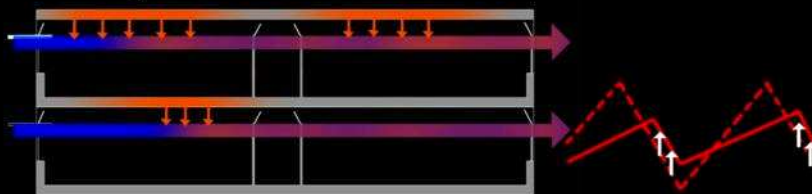
Xingfu Road – energy efficient interior design

幸福路 – 高能效的内部设计

RECAST Urumqi: Energy Efficiency

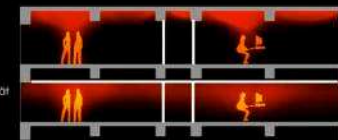


Nacht: Abgabe der Wärme an die Durchluft



Querlüften

> Kühlung
> Luftverbesse-
rung
> Aktivierung der Speicherkapazität
der Baumas-
se

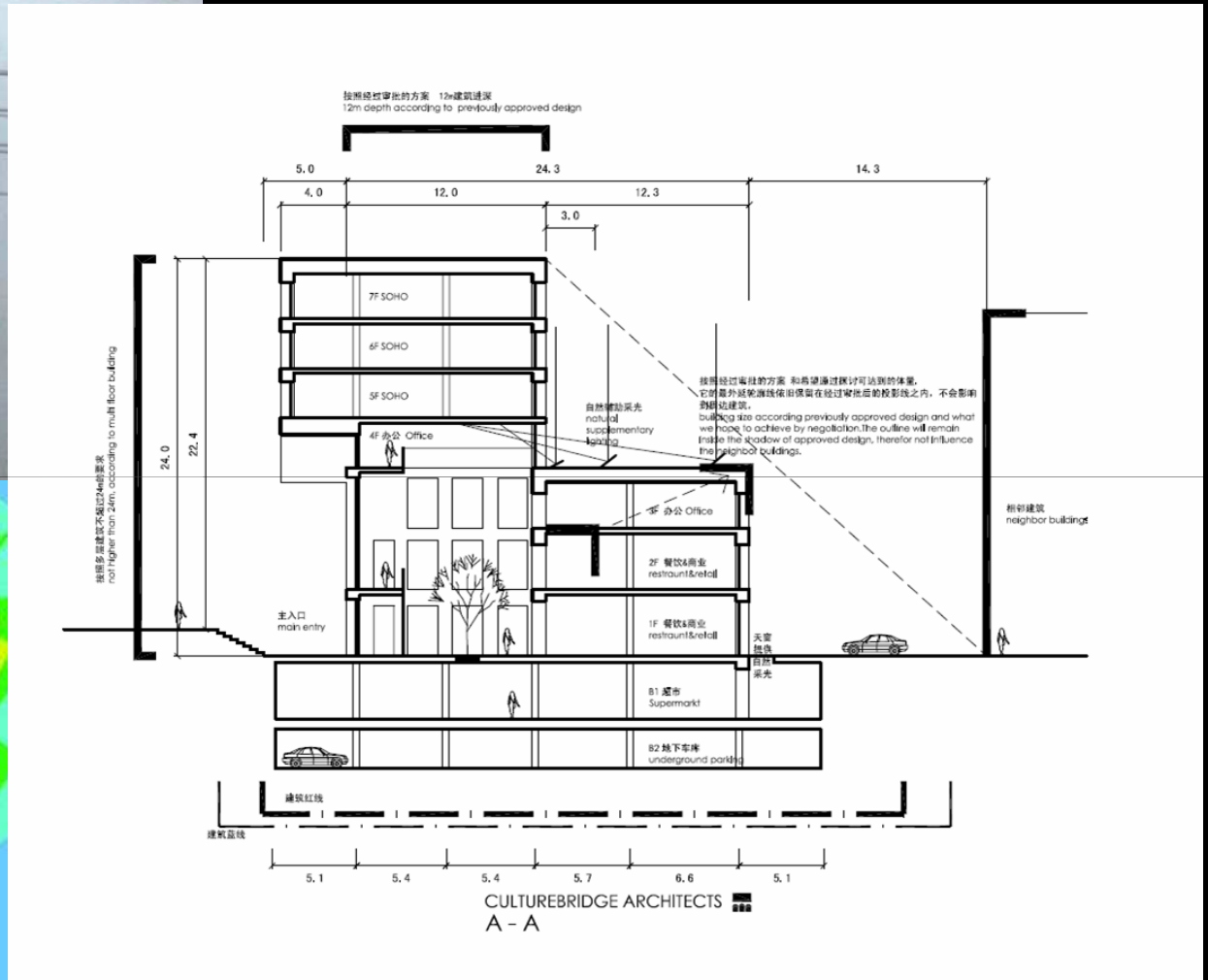
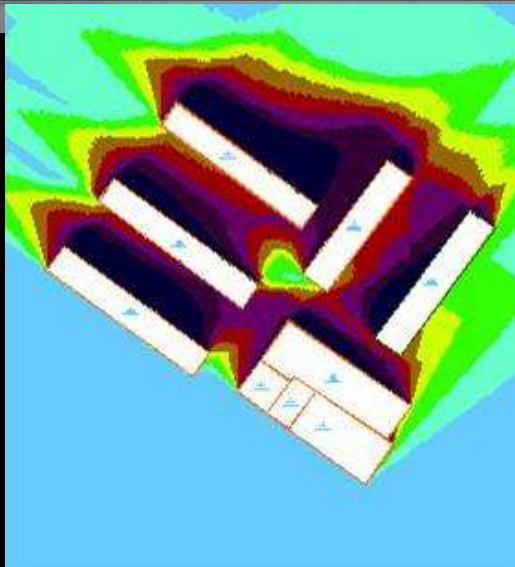
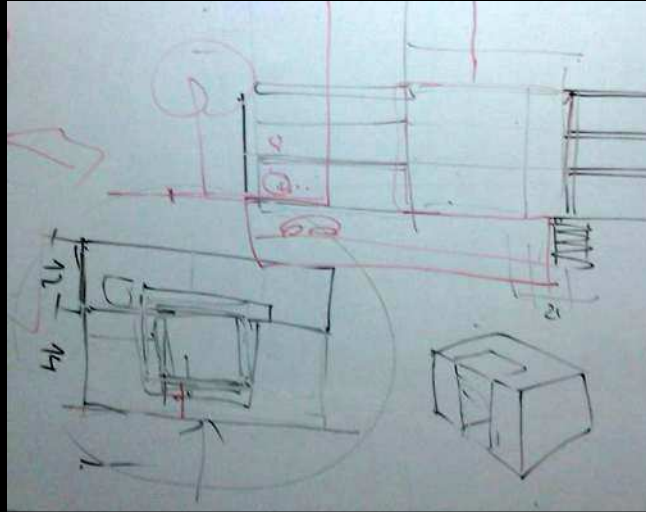


Night cooling and „activated“ concrete slabs 夜间自然通风和主动式混凝土楼板

EBRIDGE ARCHITECTS

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Xingfu Road – design progress... 幸福路 – 设计过程



Xingfu Road – present design state 幸福路 – 目前设计情况

RECAST Urumqi: Energy Efficiency

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Xingfu Road – present design state

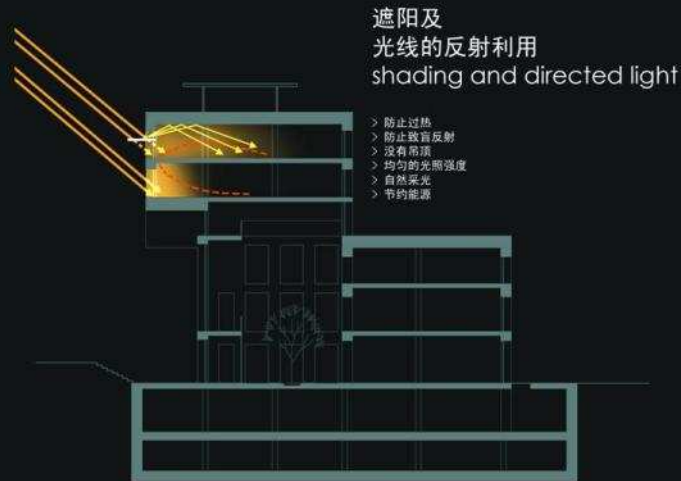
幸福路 – 目前设计情况



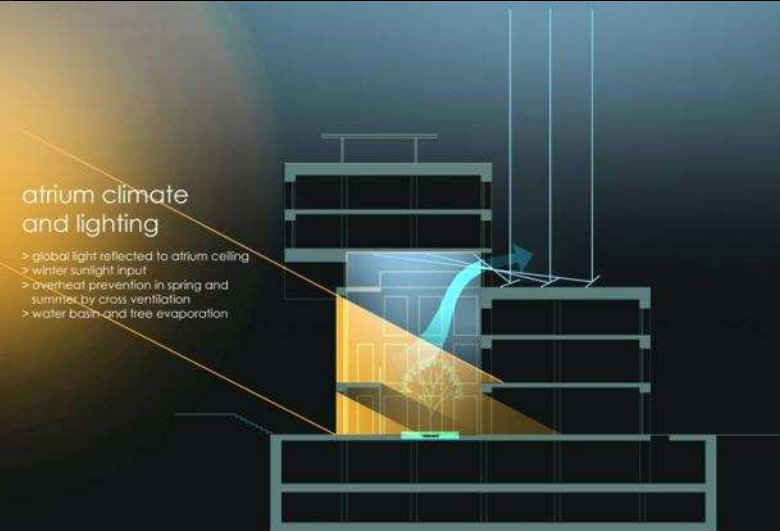
Usable outdoor spaces!

Xingfu Road – natural lighting improvement

幸福路 – 改善自然光利用



大成乌鲁木齐幸福路综合楼

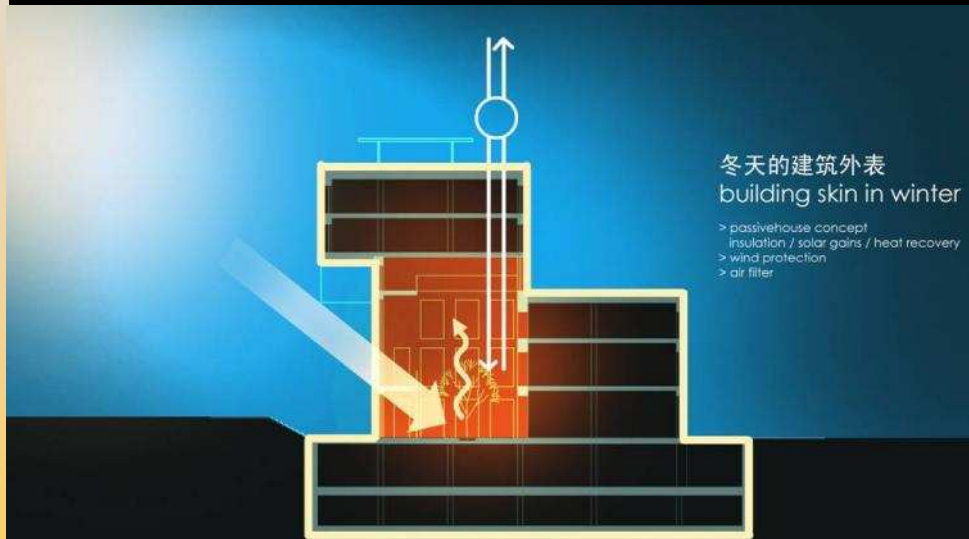


大成乌鲁木齐幸福路综合楼



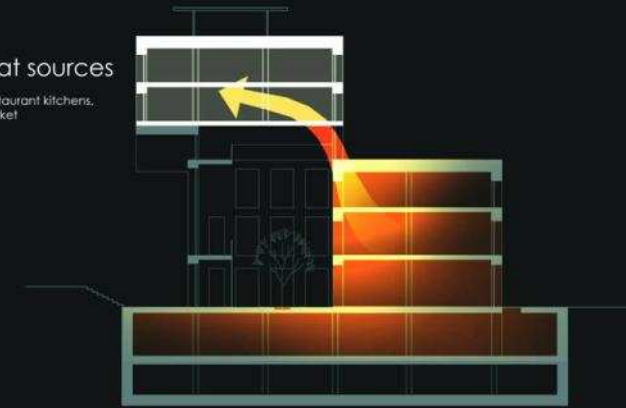
Xingfu Road – passive house concept

幸福路 – 被动式建筑方案



Internal heat sources

- > waste heat from restaurant kitchens, shops and supermarket



大成乌鲁木齐幸福路综合楼



大成乌鲁木齐幸福路综合楼

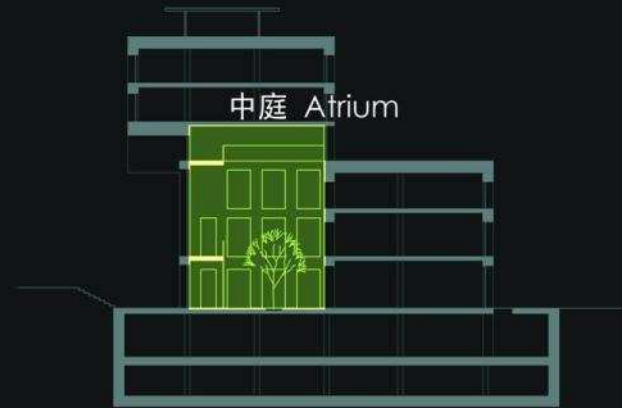


High-insulation, passive heat sources, heat recovery

高性能围护结构，被动式热源，热回收

Xingfu Road – compact surface

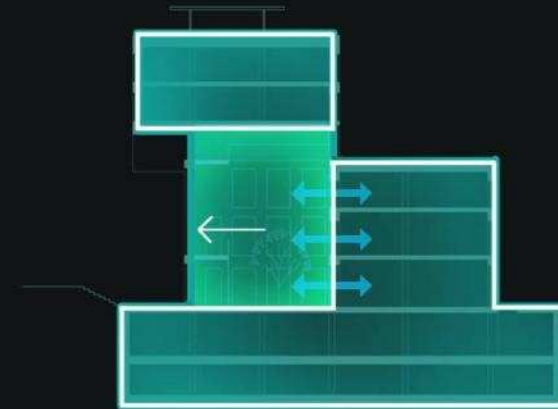
幸福路 – 紧凑外表



大成乌鲁木齐幸福路综合楼



大成乌鲁木齐幸福路综合楼



建筑外表:
较小的表面积体积
A/V-Ratio

- > 减少能量损失
- > 有控制的空气流通
- > 低能耗建筑
- > 空气过滤, 提高空气质量

内部表面
interior surface

- > natural lighting
- > better ventilation
- > higher space quality and air



Reduced exterior surface

减少外表面面积

Xingfu Road – summer climatization

幸福路 – 实现夏季优良室内热环境

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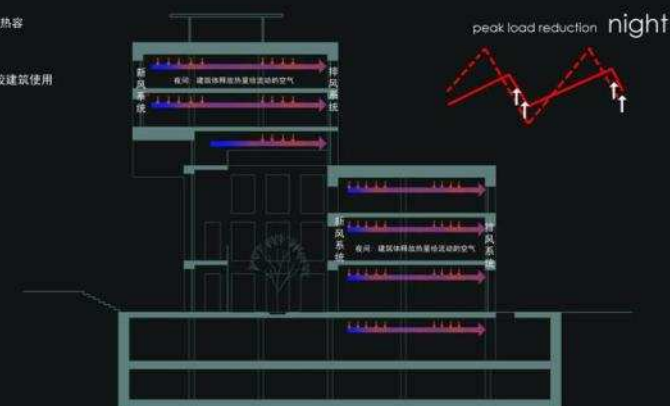


大成乌鲁木齐幸福路综合楼

CULTUREBRIDGE ARCHITECTS

夏季夜间冷却 night cooling in summer

- > 充分利用建筑体量的热容
- > 没有吊顶
- > 造价低
- > 高效
- > 非常适用于办公、学校建筑使用



大成乌鲁木齐幸福路综合楼

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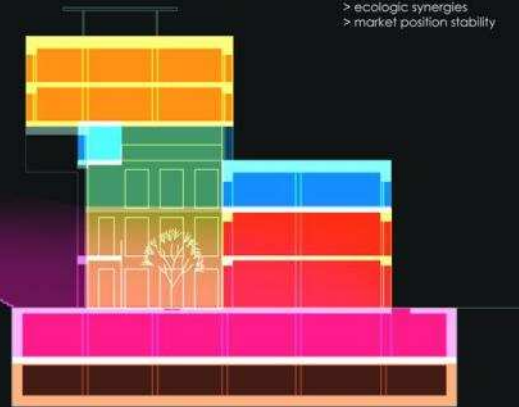
CULTUREBRIDGE ARCHITECTS

Xingfu Road – mixed use concept

幸福路 – 混合使用方案

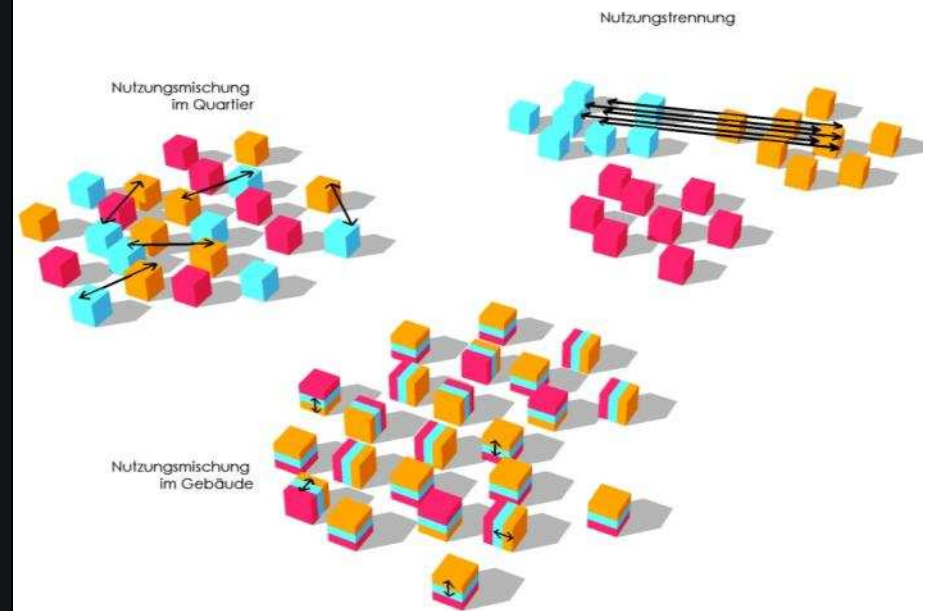
Mixed-use building

- > traffic reduction
- > functional synergies
- > ecologic synergies
- > market position stability



大成乌鲁木齐幸福路综合楼

CULTUREBRIDGE ARCHITECTS



Xingfu Road – grey water and material recycling

幸福路 – 中水和材料的循环利用



Xingfu Road – planning process 幸福路 – 计划过程

Project initiated jointly by IFEU Heidelberg and DACHENG Urumqi

该项目由海德堡能源与环境研究所和大成实业联合发起

DACHENG Industries, Inc.



Joint planning in cooperation between CULTUREBRIDGE ARCHITECTS and Xinjiang Architecture Design and Research Institute

参与合作设计方为文化桥设计公司 and 新疆建筑设计研究院



With support by Construction Committee of Urumqi City

乌市建委给予了大力支持



合作交流流程

Continuity in Cooperation Continuity in Exchange

Both Chinese and German experts participate during ALL phases:

- good for know-how exchange
- good for result quality

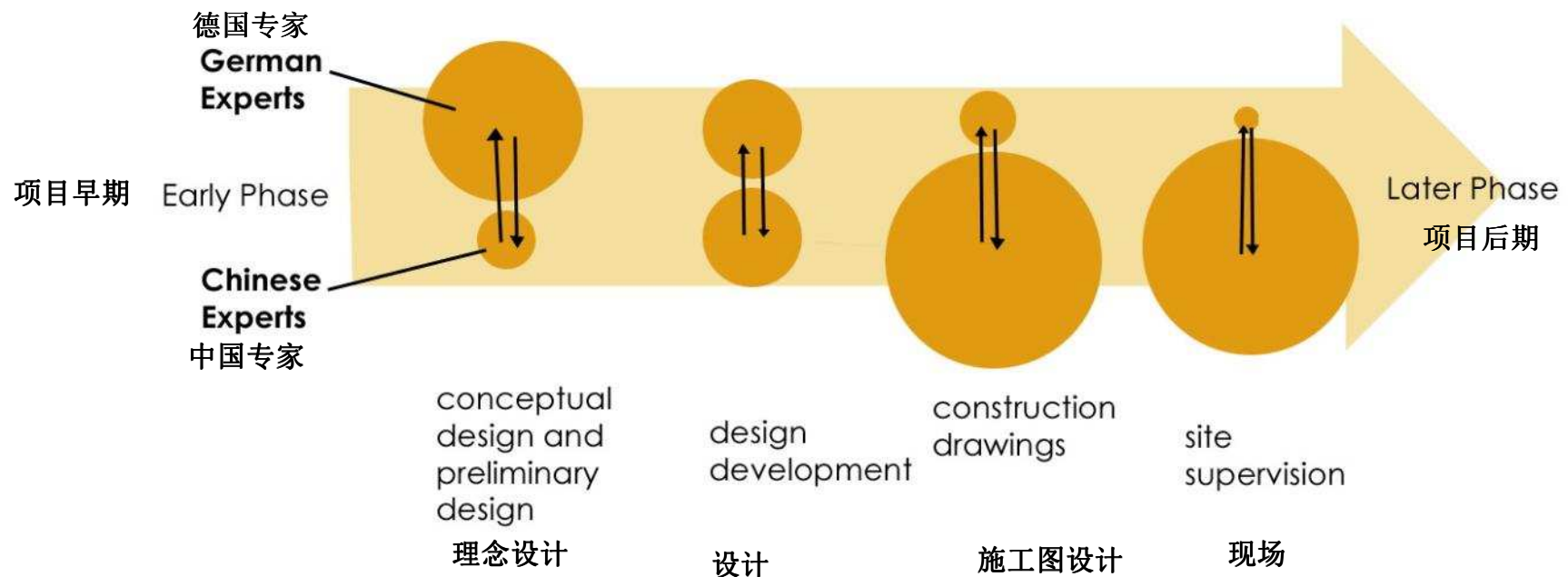
中德专家共同参与项目所有阶段

- 有利于知识交流
- 有利于结果质量保障

在工作阶段中承担任务量较大



在工作阶段中承担任务量较小



中德大型科研项目RECAST URUMQI框架下的示范项目

chinese-german research project

乌鲁木齐作为中国及中亚地区的典范，实现干旱地区可持续城市模式

a future model for sustainable dryland city in Urumqi, North China and all Central Asia

实现双赢目标：
win-win targets:

气候保护

climate protection

还给乌鲁木齐新的蓝天
blue sky for Urumqi

提高能效

energy efficiency

用被动式建筑理念降低能耗
energy reduction by passive house concept

提高生活质量

improve live quality

舒适和健康的室内环境
comfortable and healthy
indoor environment

可持续社会

sustainable society

给市民提供优质城市空间
quality city space for citizen

经济性

economic efficiency

开发低成本高效建筑模式
develop low-cost-high-efficiency
architecture

大成乌鲁木齐幸福路综合楼

CULTUREBRIDGE ARCHITECTS