生产的城市 | THE PRODUCTIVE CITY
MISSION STATEMENT

TO ENABLE PRODUCTIVE FLOWS OF PEOPLE, GOODS, KNOWLEDGE, AND ENERGY
AS OF 2010, **47% OF JINAN RESIDENTS** LIVE IN URBANIZED AREAS

BY 2040, **61% WILL BE URBANIZED**

**POPULATION PROJECTION**

**YEAR**

**1990**

**2000**

**2010**

**2020**

**2030**

**2040**

**POPULATION**

**1 MILLION**

**2 MILLION**

**3 MILLION**

**4 MILLION**

**5 MILLION**

**6 MILLION**

**7 MILLION**

**8 MILLION**

**SOURCES:** MCKINSEY & COMPANY (2009), JINAN BUREAU OF STATISTICS (2012)
POPULATIONS + SPATIAL NEEDS

- NEWLY URBANIZED
- UNIVERSITY GRADUATES
- ENTREPRENEURS
- STUDENTS
- COMMUTERS
- VISITORS

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- UNIVERSITY
- WORKSHOPS
- INCUBATOR SPACES
- MADE IN JINAN RETAIL
- OPEN FLOOR MANUFACTURING
- CANAL NETWORK
LOCAL MATERIALS

- COAL
- IRON
- GRANITE
- LIMESTONE

LOCAL PRODUCTS

- GREEN CHINESE ONION
- PINGYIN ROSE
- SHANGHE GARLIC
- LONGSHAN MILLET

LOCAL INDUSTRIES

- TRANSPORTATION EQUIPMENT
- ELECTRONIC INFORMATION
- IRON AND STEEL
- MECHANIZED EQUIPMENT
ENCLAVE CASE STUDY: FOSHAN YUAN
ENCLAVE CASE STUDY: FOSHAN YUAN
FUTURE PRODUCTION IN JINAN WEST

production  tech startups  markets  topography  education
DESIGN PRINCIPLES

Adaptable Framework

Compact Development

Layered Programming

Local Generation

Integrated Production

Smart Density
THE CASE FOR PRODUCTION

BEIJING
400KM

CONSUMPTION

JINAN CENTER
11KM

PRODUCTION

SHANGHAI
800KM

LEARNING
OVERALL CONCEPT

- MALL
- MADE IN JINAN RETAIL
- OPEN FLOOR MANUFACTURING
- UNIVERSITY CAMPUS
- RESIDENTIAL CLUSTERS & INCUBATOR SPACES
- LARGE RETAIL
- RESIDENTIAL CLUSTERS & WORKSHOPS
NEIGHBORHOOD PLAN

- UNIVERSITY
- MANUFACTURING, IT & RESEARCH LABS
- RETAIL / OFFICES / LARGER SCALE HOUSING
- LIVING + PRODUCTION
CONNECTIONS

METRO STATION + MOBILITY SHARING HUB

METRO STATION + MOBILITY SHARING HUB
SITE SECTION

• BUILDINGS HEIGHTS MAXIMIZE SOUTHERN EXPOSURE

• CROSS VENTILATION IN ALL UNITS

• ENCLAVE MICRO CLIMATE PROTECTS FROM NORTH-EAST WINTER WINDS

• DECIDUOUS TREES AS PASSIVE SEASONAL CONDITIONING

• CROSS VENTILATION THROUGH BUILDING VOIDS

• CONVECTIVE HEATING BY SUBTERRANEAN MANUFACTURING SPACE
UNIVERSITY CLUSTER SECTION

- Buildings heights maximize southern exposure
- Cross ventilation in all units
- Enclave microclimate protects from north-east winter winds
- Deciduous trees as passive seasonal conditioning
- Cross ventilation through building voids
- Convection heating by subterranean manufacturing space
SECTION AA - 1

• BUILDINGS HEIGHTS MAXIMIZE SOUTHERN EXPOSURE
• CROSS VENTILATION IN ALL UNITS
• ENCLAVE MICRO CLIMATE PROTECTS FROM NORTH-EAST WINTER WINDS
• DECIDUOUS TREES AS PASSIVE SEASONAL CONDITIONING
• CROSS VENTILATION THROUGH BUILDING voids
• CONVective HEATING BY SUBterranean MANUFACTURING SPACE
SECTION AA - 2

- Buildings heights maximize southern exposure
- Cross ventilation in all units
- Enclave microclimate protects from North-East winter winds
- Deciduous trees as passive seasonal conditioning
- Cross ventilation through building voids
- Convection heating by subterranean manufacturing space
JINAN WEST UNIVERSITY
200 x 200 M CLUSTER TYPOLOGY

TYPE A
200 x 200 M

TYPE B

TYPE C
CLUSTER ADAPTABILITY - 1

HOUSING

RETAIL

200 m

TYPE 1

TYPE 2

200 m

200 m
CLUSTER ADAPTABILITY - 4

ELEVATOR BUILDING

HIGH SCHOOL

TYPE 1

TYPE 2

ROTATED

PUSHED BACK

200 m

SHARED WORKSHOP SPACE

PUSHED BACK

200 m

200 m

200 m

200 m
CLUSTER ADAPTABILITY - 5

PRODUCTIVE ROOFSCAPE
OFFICE SPACE

START-UP SPACE

LIVE & WORK UNITS

FURNITURE WORKSHOP

TYPE 1

TYPE 2
100 x 100 M ENERGY STRATEGY

- BIKE SHARING & STORAGE
- BUS STOP
- SUMMER WIND
- STEAM IN CHILLED WATER
- GEOTHERMAL PIPES
- RAINWATER TANKS
- SOLAR HOT WATER SYSTEM
- PV PANELS
- DECIDUOUS TREES
- STACK EFFECT
- MINI WATER CANAL

Floor numbers:
1. FAB LAB
2. LEARNING CENTER
3. GREEN HOUSE
4. OFFICE SPACE
5. DWELLING UNITS
6. ROOF GARDEN
7. RETAIL
8. CONNECTOR
9. PUBLIC SPACE
LIVE + PRODUCTION CLUSTER SECTIONS

- Buildings heights maximize southern exposure
- Cross ventilation in all units
- Enclave microclimate protects from north-east winter winds
- Deciduous trees as passive seasonal conditioning
- Cross ventilation through building voids
- Convection heating by subterranean manufacturing space

SECTION AA

SECTION BB
SECTION AA - 1

- BUILDINGS HEIGHTS MAXIMIZE
- SOUTHERN EXPOSURE
- CROSS VENTILATION IN ALL UNITS
- ENCLAVE MICRO CLIMATE PROTECTS FROM NORTH-EAST WINTER WINDS
- DECIDUOUS TREES AS PASSIVE SEASONAL CONDITIONING
- CROSS VENTILATION THROUGH BUILDING VOIDS
- CONVECTIVE HEATING BY SUBTERRANEAN MANUFACTURING SPACE
• BUILDINGS HEIGHT MAXIMIZE SOUTHERN EXPOSURE
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• CONVECTIVE HEATING BY SUBTERRANEAN MANUFACTURING SPACE
ENABLING ENTREPRENEURSHIP
LAYERED BUILDING PROGRAM

PROPOSED 6 FLOOR WALKUP
- FAR = 2.21

GROUND LEVEL
- FABRICATION / MANUFACTURING
- R&D INCUBATION HUBS
- STUDENT RESEARCH

1ST LEVEL
- SHARED OFFICES / FACILITIES
- COLLABORATIVE WORK SPACE

2ND-3RD LEVEL
- ADAPTABLE LIVE/WORK UNITS
- SHARED TERRACES

4TH - 5TH LEVEL
- STUDENT HOUSING
- STUDIOS

GROUND LEVEL
- FABRICATION / MANUFACTURING
- R&D INCUBATION HUBS
- STUDENT RESEARCH
PRODUCTION/spaces

SHARED WORKSPACE / UNIVERSITY RESEARCH & INCUBATION SPACE
• 1ST LEVEL
• AREA: 200-225 M

FABRICATION / WORKSHOPS
• GROUND LEVEL
• AREA: 360-380 M
ADAPTABLE LIVE / WORK SPACES

FLEXIBLE HOUSING UNIT
- 2ND - 3RD / 4TH LEVEL
- AREA: 60 M (PRE-ADAPTATIONS)

SUMMER WINDS
WINTER WINDS
SOUTH FACING SUN EXPOSURE
CROSS VENTILATION
FLEXIBILITY BETWEEN UNITS

A  2BED UNITS
   60 M

B  1BED + OFFICE
   60 M
FLEXIBILITY BETWEEN UNITS

A
STUDIO,
55 M

B
2BED
60 M

C
4BED
130 M
ADAPTABILITY OVER TIME

A  2BED
   60 M

B  3BED
   70 M

C  1BED
   45 M
ADAPTABILITY OVER TIME

A  2-BED
   60 M
   ♂ ♂

B  2BED + OFFICE
   85 M
   ♂ ♂ ♂
   +

C  EFFICIENCY UNIT
   35 M
   ♂
FLEXIBILITY THROUGH PREFAB COMPONENTS

PLUMBING CORE
BATHROOM
KITCHEN UNIT
PARTITION
STORAGE UNIT

2 bedroom

1 bedroom w/ small office

event space

1 bedroom switched Kitchen & wc

DOMESTIC TRANSFORMER, GARY CHANG, HONG KONG
LIVING SMALL

STUDIOS & STUDENT HOUSING
- 4TH - 5TH LEVEL
- AREA: 48-60 M

utilizing vertical space  modular / collapsible elements
ENERGY STRATEGY

Compact Development

Local Generation

Smart Density
HOW IT STACKS UP

AVERAGE BUILDING HEIGHTS

SUNSHINE 100
TOWER IN A PARK

FOSHAN YUAN
SIMPLE ENCLAVE

THE PRODUCTIVE CITY
LAYERED ENCLAVE

14.9

5.8

5.7
HOW IT STACKS UP

BUILDING COVERAGE RATIOS

SUNSHINE 100
TOWER IN A PARK
14%

FOSHAN YUAN
SIMPLE ENCLAVE
38%

THE PRODUCTIVE CITY
LAYERED ENCLAVE
39%
HOW IT STACKS UP

FLOOR AREA RATIOS

SUNSHINE 100
TOWER IN A PARK

FOSHAN YUAN
SIMPLE ENCLAVE

THE PRODUCTIVE CITY
LAYERED ENCLAVE
HOW IT STACKS UP

UNIT SIZE

SUNSHINE 100
TOWER IN A PARK

FOSHAN YUAN
SIMPLE ENCLAVE

THE PRODUCTIVE CITY
LAYERED ENCLAVE

200m²

95m²

68m²
HOW IT STACKS UP

ENERGY CONSUMPTION

SUNSHINE 100
TOWER IN A PARK
134.9

FOSHAN YUAN
SIMPLE ENCLAVE
73.6

THE PRODUCTIVE CITY
LAYERED ENCLAVE
80.9
SHARED MOBILITY

VELIB BIKE SHARE
PARIS, FRANCE
DISTRICT ENERGY
UNIVERSITY COGENERATION

MIT
SINGLE GAS TURBINE
21 MEGAWATT OUTPUT
(31,500 HOUSEHOLDS)

YALE UNIVERSITY
THREE (3) DUAL FUEL GAS TURBINES
18.5 MEGAWATT OUTPUT
(28,000 HOUSEHOLDS)

UNIVERSITY OF WISCONSIN
TWO (2) NATURAL GAS TURBINES
150 MEGAWATT OUTPUT
(225,000 HOUSEHOLDS)
LOCAL DISTRIBUTED GENERATION

DISTRIBUTED GENERATION

80% EFFICIENCY

GRID GENERATION

30% EFFICIENCY

HEAT RECOVERY

DISTRIBUTION LOSSES

TRANSMISSION LOSSES

DISTRIBUTION LOSSES
A CLEAN ENERGY PORTFOLIO IS A **DIVERSE ENERGY PORTFOLIO**

- **BASE LOAD**
- **BIOGAS**
- **SOLAR PV**
- **GEOTHERMAL**
- **SOLAR THERMAL**
A MIXTURE OF ENERGY USERS ENABLES **DISTRICT ENERGY**
PROFORMANCE

OPERATIONAL TRANSPORTATION EMBODIED RENEWABLE

Preliminary Design
- Initial Concept
- Enclave + Productive Mat
- Southern Orientation

Revised Design
- Increased Building Heights
- Reduced Building Coverage
- Introduced Open Space

Final Design
- Reduced Unit Sizes
- Smaller Building Footprints
- Added Community Institution
谢谢

THANK YOU