# WHITE ECOLOGY — A Cradle To Cradle City Transformation For Carrara

## FRAMEWORK

### 1. TYPICAL PROBLEM IN POST-MINING CITY

single industrial structure
lead to economic crisis

ENVIRONMENTAL · ECONOMICAL · SOCIAL

environmental degradation · pollution · natural disaster · ageing society · outmigration · unemployment

3 PILLARS OF SUSTAINABLE DEVELOPMENT

### 2. CASE STUDY: MICROREGION SOKOLOV- EAST (CZECH REPUBLIC) - FROM OPENCAST PITS TO NEW LANDSCAPES

INDUSTRIAL TRANSFORMATION LEADS CITY TRANSFORMATION

### 3. SUSTAINABLE URBAN DEVELOPMENT THINKING – CRADLE TO CRADLE

BIOLOGICAL CYCLE · TECHNICAL CYCLE

### 4. NEW INDUSTRY OPPORTUNITY FOR CARRARA

MARBLE WASTE RECYCLING

### 5. THEORETICAL REFERNCES AND CASES STUDY

URBAN PLANNING: ITALIAN PLANNING REGULATIONS
METHODOLOGY: GEODESIGN
LANDSCAPE THEORY AND CONCEPT, 3 TOPIC CASES STUDY

Landscape Urbanism · Smart City
Design with Nature · Resilient City
A City Is Not a Tree · Sustainable City
Biville quarryPark
Copenhagen Cloudburst Formula
IBA Emscher Park

### 6. SOICAL PROFILE AND EVALUATION

CARRARA'S CURRENT SITUATION SURVEY
TANGIBLE AND INTANGIBLE EVALUATION

### 7. PLANNING CONCEPT: TREE OF CARRARA

THE METABOLISM OF A CHERRY TREE · THE METABOLISM OF CARRARA

A NEW CITY PLANNING BASED ON THE INDUSTRIAL TRANSFORMATION

ECONOMICAL · ENVIRONMENTAL · SOCIAL

STAGE 1: QUARRY REGENERATION · STAGE 2: RESILIENT CITY · STAGE 3: URBAN TRANSFORMATION

### 8. STAGE PLANNING AND DESIGN
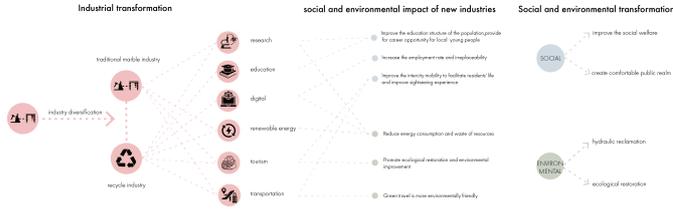
STAGE 1 · STAGE 2 · STAGE 3

CRADLE 1: THE QUARRY · CRADLE 2: THE INDUSTRIAL DISTRICT

### 9. RISK MITIGATION AND OUTCOME PROSPECT

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## 1. TYPICAL PROBLEM OF POST-MINING CITY IN EUROPE

**Salgótarján (Hungary)**
Mine: brown coal
Environmental condition:
landscape degradation
vast rustbelt remained
small landslide
Inhabitants: 40441
Population change(1990-2010): -15.4%
Unemployment rates in 2010: 12.8%
Ageing society

**Mansfeld-Südharz (Germany)**
Mine: copper
Environmental condition:
landscape degradation
contaminated by heavy metals,
water and airborne toxic waste
Inhabitants: 155255
Population change(1990-2010): -19.9%
Unemployment rates in 2010: 17.8%
Ageing society

**Sokolov-vychod (Czech Republic)**
Mine: brown coal
Environmental condition:
landscape degradation
"moonscape"
industrial pollution
Population change(1990-2010): 0.9%
Unemployment rates in 2010: 10%
Ageing society

**Steirische Eisenstraße (Austria)**
Mine: salt and iron
Environmental condition:
outstanding mining landmark
underground excavation
heavy metal pollution
Inhabitants: 60938
Population change(1990-2010): -13.2%
Unemployment rates in 2010: 5.3%
Ageing society

**Wałbrzych (Poland)**
Mine: hard coal
Environmental condition:
Air, water and soil contamination
significant mining damage
gas risk
Inhabitants: 122411
Population change(1990-2010): -13.2%
Unemployment rates in 2010: 7.7%
Ageing society

**Zasavje (Slovenia)**
Mine: Brown coal
Environmental condition:
erosion and denudation
prevailing species get severely damaged
air and soil pollution
Inhabitants: 44750
Population change(1990-2010): -5.3%
Unemployment rates in 2010: 11.6%
Ageing society

**Zwickau-Lugau-Oelsnitz (Germany)**
Mine: hard coal
Environmental condition:
Air, water and soil pollution
landscape degradation
small landslide
Inhabitants: 161182
Population change(1990-2010): -17.4%
Unemployment rates in 2010: 12%
Ageing society

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## 2. CASE STUDY: CITY TRANSFORMATION OF MICROREGION SOKOLOV- EAST (CZECH REPUBLIC)

Industrial transformation

traditional marble industry
industry diversification
recycle industry

research · education · digital · renewable energy · tourism · transportation

social and environmental impact of new industries

Improve the education structure of the population provide for career opportunity for local young people
Increase the employment rate and irreplaceability
Improve the intercity mobility to facilitate residents' life and improve sightseeing experience
Reduce energy consumption and waste of resources
Promote ecological restoration and environmental improvement
Green travel is more environmentally friendly

Social and environmental transformation

SOCIAL
improve the social welfare
create comfortable public realm

ENVIRONMENTAL
hydraulic reclamation
ecological restoration

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## 3. SUATAINABLE URBAN DEVELOPMENT THINKING: CRADLE TO CRADLE

Cradle to Cradle (C2C) is about seeing garbage as an eternal resource and doing the right thing from the beginning. It is about making community and product development function in the same way as a healthy ecological system where all resources are used effectively, and in a cyclical way (as opposed to the current linear system that can be better described as a Cradle to Grave system).

Biological Cycle for Products for consumption
Technical Cycle for Products for Service

(Image from: https://ap.columbia.edu/sustainability/tag/cyclical/)

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## 4. NEW RECYCLE INDUSTRY OPPORTUNITY FOR CARRARA: MARBLE WASTE RECYCLING

**Marble waste used in the construction industry**
asphalt, cement, concrete, mortar and bricks.

asphalt made by marble waste material · mortar made by marble waste material · cement made by marble waste material · brick made by marble waste material · concrete made by marble waste material

**Marble waste fine processing**

artificial granite · calcium carbonate masterbatch · heavy calcium carbonate powder · environmentally friendly paint

**Marble waste used to produce paper**

TLM, a company based in the southern city of Italian, has pioneered a process that takes marble waste and converts it into high-quality paper.
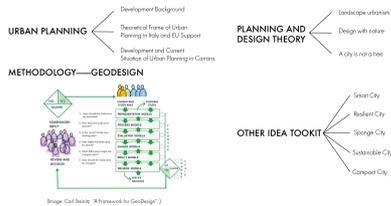
**Marble waste used to produce cultural and creative products**

There are some independent artist and designer have developed some great ideas to recycle the waste material into handicraft. These waste materials are used for furniture and containers. Some larger size leftovers can still be carved into small sculptures for household items, etc.

**Marble waste used in high-tech processing**

MarbleEcoDesign

An Italian institution Marble Eco Design has developed a research project the main goal is to develop a new 3D printing technique, exploiting debris material resulting from common marble cave operations. In addition, some scientific research institutions are also dedicated to researching the production of high-tech processing marble slag products. These products can also be used in the production of some electronic products, chips, and ultimately in the artificial intelligence industry.

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## 5. THEORATICAL REFERENCES AND CASES STUDY:

**URBAN PLANNING**
Development Background
Theoratical Frame of Urban Planning in Italy and EU Support
Development and Current Situation of Urban Planning in Carrara

**METHODOLOGY——GEODESIGN**

(Image: Carl Steinitz "A Framework for GeoDesign")

**PLANNING AND DESIGN THEORY**
Landscape urbanism
Design with nature
A city is not a tree

**OTHER IDEA TOOKIT**
Smart City
Resilient City
Sponge City
Sustainable City
Compact City

### 3 DESIGN TOPIC CASE STUDY

**Case Study 1: Quarry Restoration and Landscape Design - Biville quarryPark**

| | Biville quarryPark | Our Project |
|---|---|---|
| similarity | 1.Very large scale and large height difference; 2.Severe land degradation and environmental damage; 3.Could be a potential geoheritage place and develop tourism | |
| difference | 1. Single inactive quarry 2. Good soil conditions 3. Large vegetation cover | 1.Series quarries both active and inactive 2. Bare rockiness surrounding 3. Secondary vegetation |
| key points | 1. Ecological restoration at first stage 2. The design thinking of the hydraulic system and waterfront space 3. Vegetation reclamation | |

**Case Study 2: Resilient City Strategy - The Copen- hagen Cloudburst Formula**

| | Copenhagen Cloudburst Formula | Our Project |
|---|---|---|
| similarity | 1.Faced the same threat of flooding; 2.Possess the similar environment or downtown area; 3. Resilience improvement is necessary for city transformation | |
| difference | 1.Flooding from storm 2. Ponding area are scattered in the city | 1. Flooding from upstream of river 2. Ponding problems are concentrated along the river |
| key points | 1.Systematic decision-making model; 2.Comparison between the innovative project and conventional method to demonstrate the advantages of the project 3.Communication between experts and stakeholders | |

**Case Study 3: Urban Transformation - IBA Emscher Park, Ruhr district**

| | IBA Emscher Park | Our Project |
|---|---|---|
| similarity | 1.Industrial sites basically built along the river 2. River pollutant caused by industrial waste 3. Employment situation needed to be improved | |
| difference | 1.Already closed mines 2.Large green area by connecting patches | 1.Quarries are still working 2. Low ecological connectivity |
| key points | 1.Interconnection between all the industrial district 2.Ecological restoration strategy 3.Keep the original status of the industrial area, respect the industrial culture | |

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