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The use of water for technical development or technical development for the use of water?

Ambrogio, Fabio, Comino, Elena, Dominici, Laura and Ros, Maurizio

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THE USE OF WATER FOR TECHNICAL DEVELOPMENT OR TECHNICAL DEVELOPMENT FOR THE USE OF WATER?

Systemic and Ecological considerations about the CLEAN energy production in urban context

Elena Comino, Fabio Ambrogio, Laura Dominici, Maurizio Rosso

RS D7 2018

Relating Systems Thinking and Design 7 Symposium, 24-26 October 2018, Politecnico di Torino

DESIGN OF IN FOR THE TERRITORY

"CUT CROSS BOUNDARIES"RESEARCH AND PRACTICE

INTERDISCIPLINARITY

INVOLVEMENT OF DIFFERENT BACKGROUNDS

- Engineering
  Fabio Ambrogio & Maurizio Rosso
- Applied Ecology
  Elena Comino
- Systemic Design
  Laura Dominici

AGENDA 2030
SUSTAINABLE DEVELOPMENT GOALS

7 AFFORDABLE AND CLEAN ENERGY

INCREASE GLOBAL PERCENTAGE OF RENEWABLE ENERGY

MANAGEMENT OF LOCAL RESOURCES
EVALUATION OF NATURAL OPPORTUNITIES

Aim to design resilient, sustainable and inclusive cities

ENERGY IS A PUBLIC RIGHT!

ENSURE ACCESS TO CLEAN ELECTRICITY FOR ALL

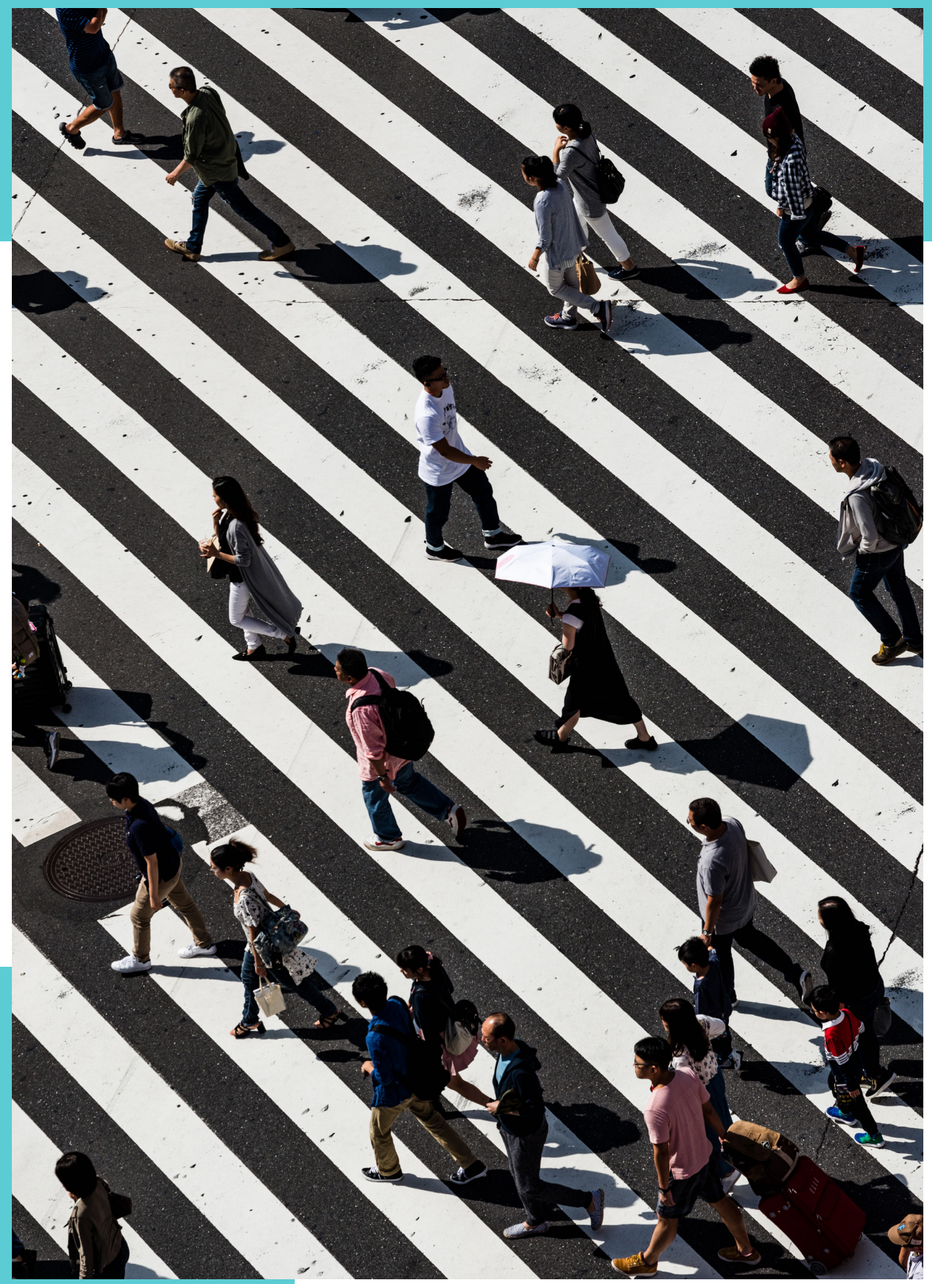
FOCUS NOT ONLY ON THE **QUANTITY**
OF THE ENERGY PRODUCED, BUT ALSO ON THE
QUALITY

When can we call the energy "CLEAN"?

- from renewable resources
- few outputs or nothing
- no consistent impact on the environment (in term of resilience)

URBAN CONTEXT

complex system of tangible and intagible aspects



WHY DO WE NEED TO FOCUS ON CITIES?

In 2050 nearly 70% of global population will reside in cities
(UN-HABITAT, 2011)

75% of global energy demand

75% of total emission of GHGs

2% cover of global surface

FOCUS ON INNOVATIVE POTENTIAL IN LOW-CARBON TRANSITION

UNDERSTAND RELATIONSHIPS BETWEEN HUMANS AND THEIR CONTEXT

3 analytical and practical tools to analyse human needs, ecosystem services and urban context

Urban Ecology

Urban ecology is the study of ecological processes in urban environments. This includes all aspects of the ecology of any organisms found in urban areas

Nature

Urban Metabolism

“The sum total of the technical and socio-econimic processes that occur in cities, resulting in growth, production of energy and elimination of waste”

Kennedy, 2007

Systems Thinking

Holistic approach and lens to visualize and understand the structure of complex systems in everyday life, focusing on interconnections between parts

Comino, Dominici, Peruccio, 2018

DESIGN PRINCIPLES GUIDELINES FOR INTERDISCIPLINAR ISSUES

ECOLOGICAL ENGINEERING PRINCIPLES

Emerging discipline that answers to the increasing demand for providing benefits for human welfare and preserving natural environment. It recognizies that humans and their environment are mutually dependent and they cannot be addressed separately.

(Bergen, Bolton, Fridley, 2001)

DESIGN CONSIDERING NATURAL SYSTEMS

DESIGN FOR SITE-SPECIFIC CONTEXT

ECOSYSTEMS CAN FUNCTION WITHOUT HUMAN INTERVENTION

DESIGN FOR EFFICIENCY IN ENERGY AND INFORMATION

DEFINE THE PURPOSE OF DESIGN INTERVENTION

DESIGN PRINCIPLES GUIDELINES FOR INTERDISCIPLINAR ISSUES

SYSTEMIC DESIGN PRINCIPLES

Design approach that integrates the Systems Thinking with the Human-centred Design. It focuses on processes and connctions between system's components. The approach is based on the principle that "the output of a system is the input of another one".

(Bistagnino, 2011)

THE OUTPUT OF A PROCESS BECOME INPUT TO ANOTHER ONE

RELATIONS GENERATE THE SYSTEM ITSELF

AUTOPOIETIC SYSTEMS SUSTAIN AND REPRODUCE THEMSELVES

ACT LOCALLY

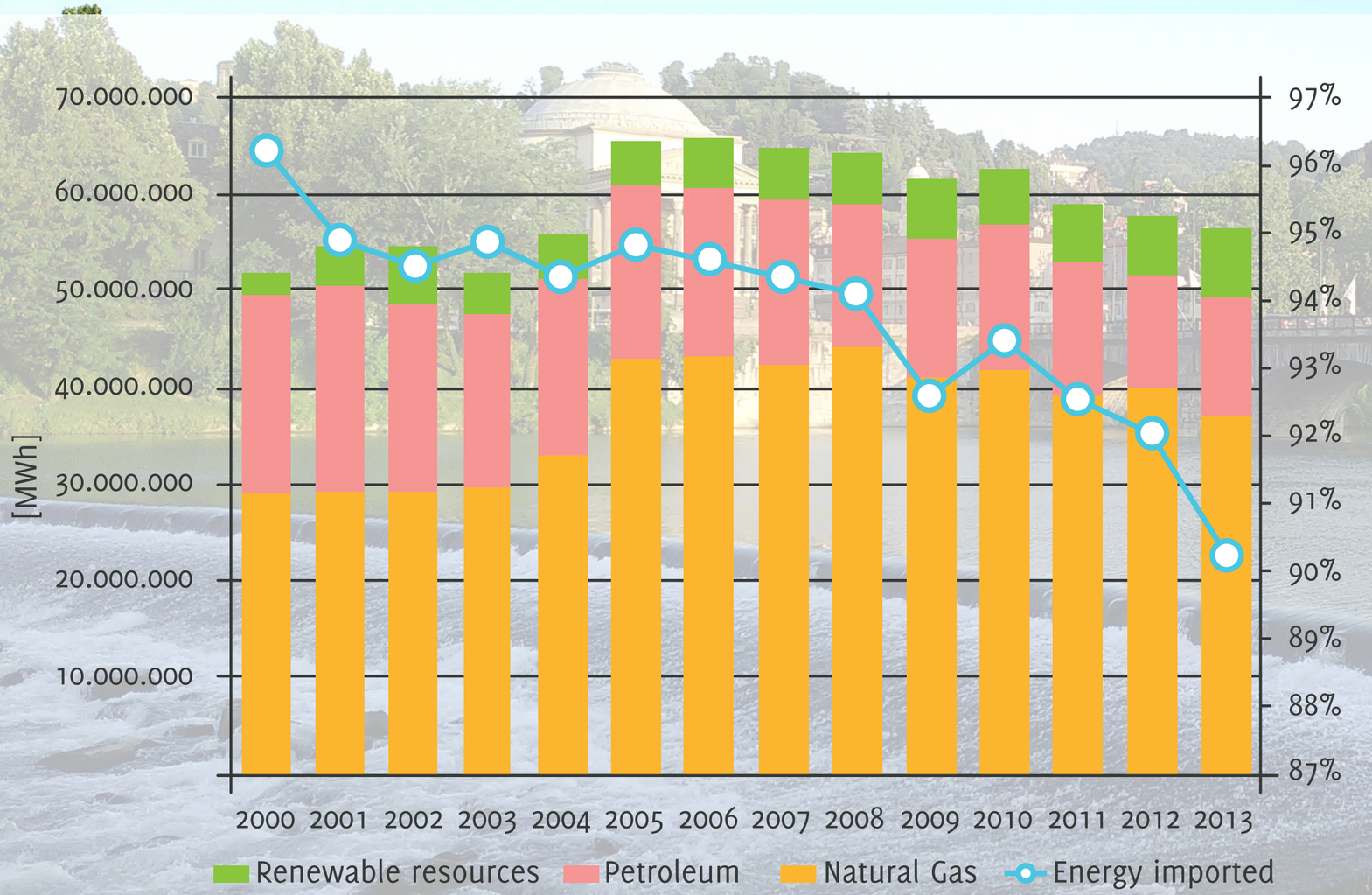
MAN CONNECTED TO OWN ENVIRONMENT

CASE STUDY
THE CITY OF TORINO

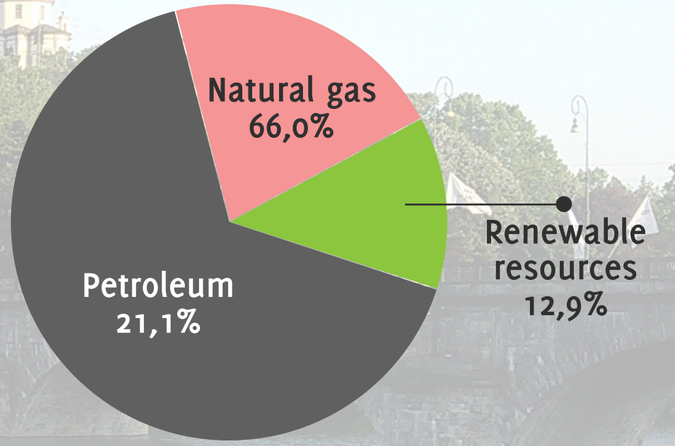
FRAMEWORK ON RENEWABLE ENERGY

CASE STUDY
THE CITY OF TORINO

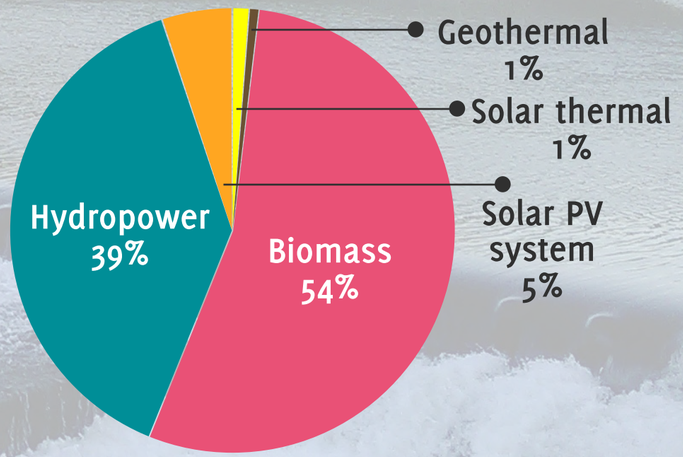
FRAMEWORK ON RENEWABLE ENERGY



ENERGY RESOURCES



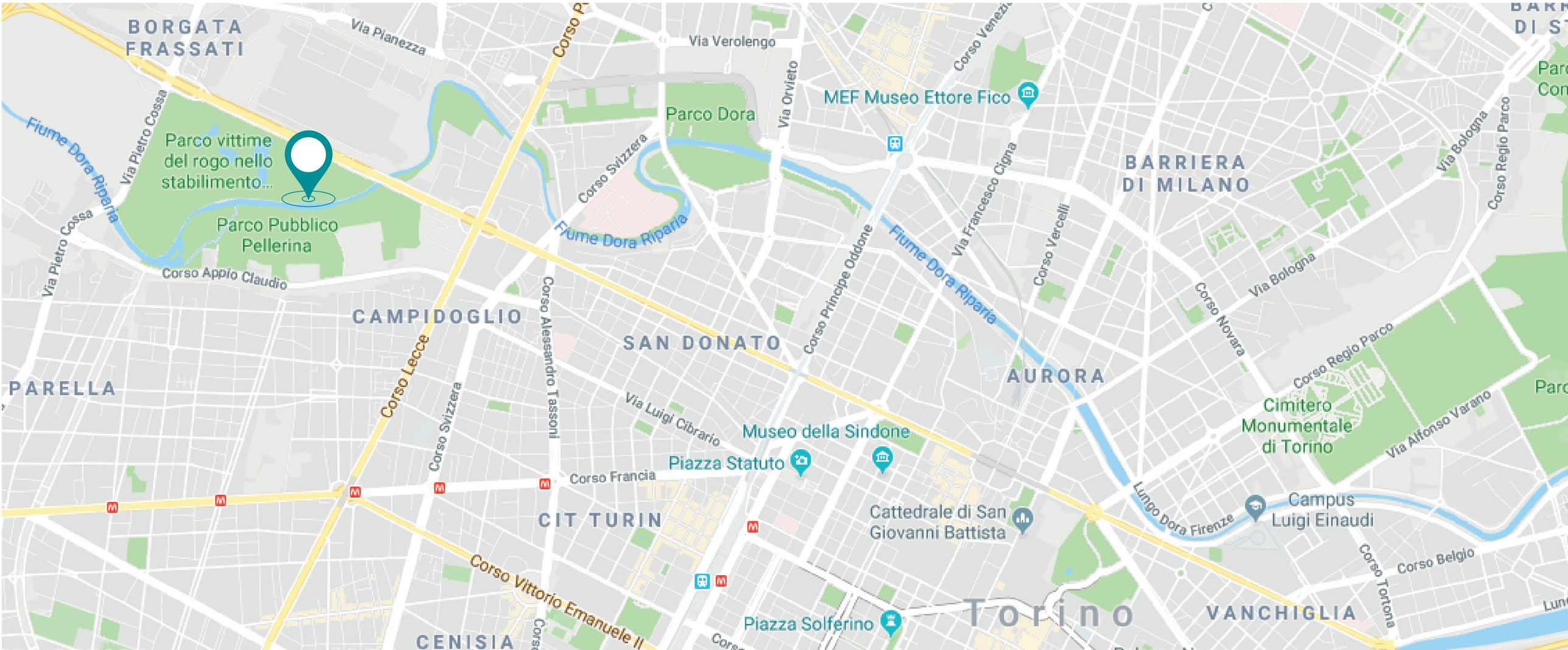
RENEWABLE RESOURCES



Source: 9° Rapporto sull'Energia, Provincia di Torino, dicembre 2014

CASE STUDY
THE CITY OF TORINO

MINI HYDROPOWER SCENARIO IN TORINO



CASE STUDY
THE CITY OF TORINO

MINI HYDROPOWER SCENARIO IN TORINO

DORA RIPARIA RIVER
PELLERINA PUBLIC PARK

Good practice in management
of water resource

CASE STUDY
THE CITY OF TORINO

HISTORICAL DAM OF REGIO PARCO, DORA RIPARIA RIVER

1758

start of construction of the industrial estate “Manifattura Tabacchi”, the dam in the Dora Riparia river and the artificial canal Regio Parco

1996

end of industrial activity of the Manifattura Tabacchi and neglect of river infrastructures

AIM

RESTORATION OF ANCIENT DAM OF DORA RIPARIA

REDUCTION OF FLOODING RISK IN THE AREA

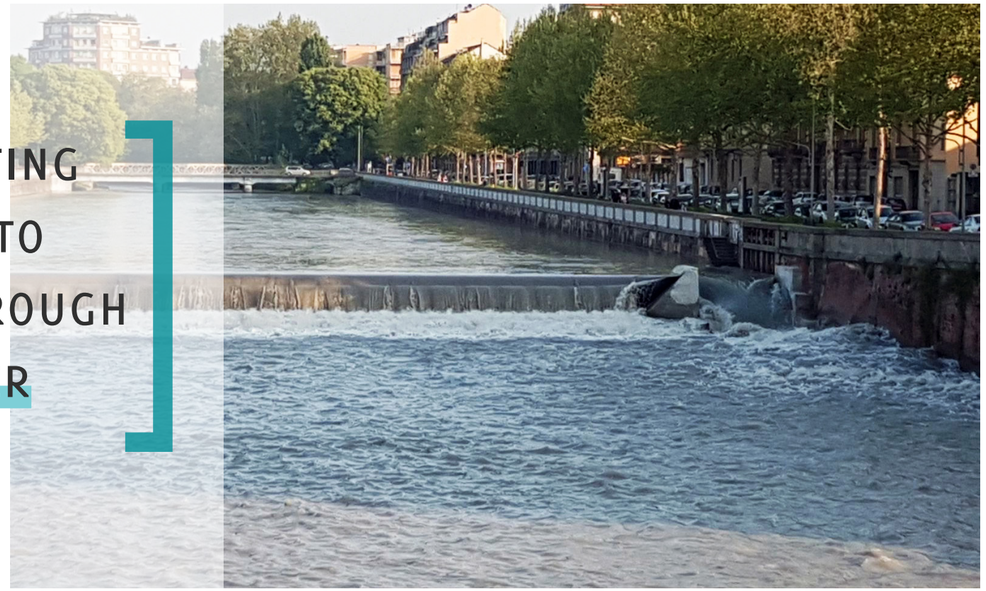
CASE STUDY
THE CITY OF TORINO

HISTORICAL DAM OF REGIO PARCO, DORA RIPARIA RIVER

CASE STUDY
REGIO PARCO DAM

ACT LOCALLY! USE OF LOCAL RESOURCES

USING OF THE EXISTING HYDRAULIC HEAD TO PRODUCE ENERGY THROUGH **MINI HYDROPOWER**



Request of evaluation of impact assessment (VIA)

2014

JULY

Concession by local authority to restore and use the historical dam of dora riparia for hydropower

2016

OCTOBER

Start of construction

2017

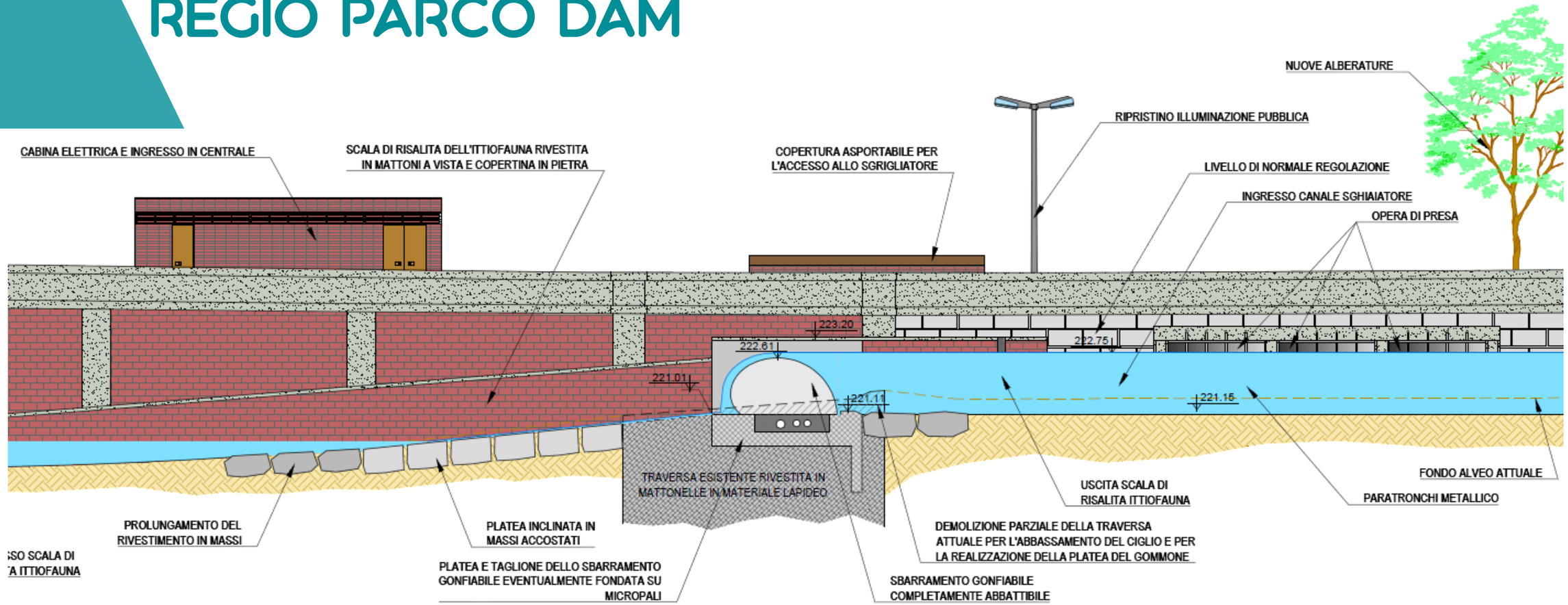
JANUARY

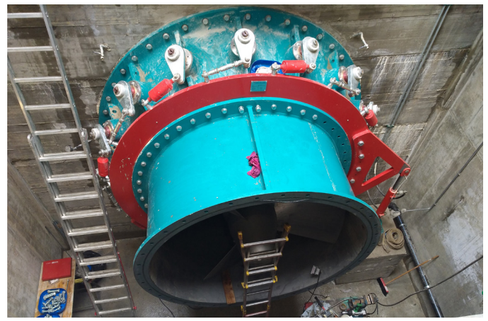
End of construction

2018

AUGUST

CASE STUDY
REGIO PARCO DAM





ECOLOGICAL AND ENVIRONMENTAL ASPECTS

- enviromental impact assessment: not necessary, the area is inside the urban context and the infrastructure is already there
- secure the “minimal vital water flow” through inflatable dam
- fish ladder to preserve the passage of fishes and to ensure the continuity of river ecosystem
- creation of pedestrian area to redevelop the surrounding area
- planting trees and new vegetation (vegetation statement)
- consider already used materials for new infrastructures, preserve the same material language and landscape inclusion
- no output at the end of the energy production

BENEFITS PRODUCED FOR THE CITY

POWER: 248,6 KW

ENERGY PRODUCED: 1,7 GWH/YEAR

ENERGY REQUIREMENT: 600 FAMILIES

AVOIDED EMISSIONS OF CO2: 930 T/YEAR

ESOSYSTEM SERVICES IN URBAN CONTEXT

ENVIRONMENTAL

ENHANCE LOCAL RESOURCE WITHOUT ENVIRONMENTAL IMPACTS AND OUTPUTS

ECONOMIC

PRODUCE ENERGY NEAR THE PLACE OF USE

SOCIAL

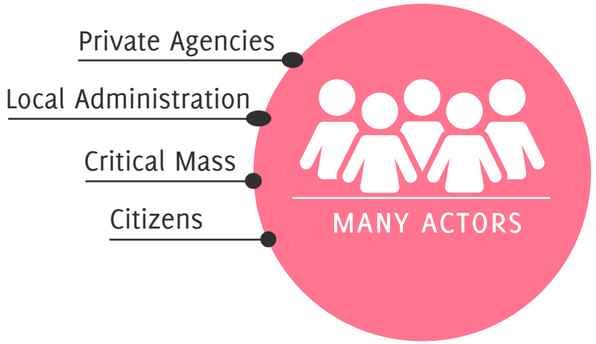
REDEVELOP DEGRADED AREA

CULTURAL

RESTORE AND RECOVER HISTORICAL INFRASTRUCTURE CONNECTED TO THE INDUSTRIAL HERITAGE OF THE CITY OF TORINO

COMPLEX ASPECTS OF WATER RESOURCE MANAGEMENT

COMPLEX ASPECTS OF WATER RESOURCE MANAGEMENT



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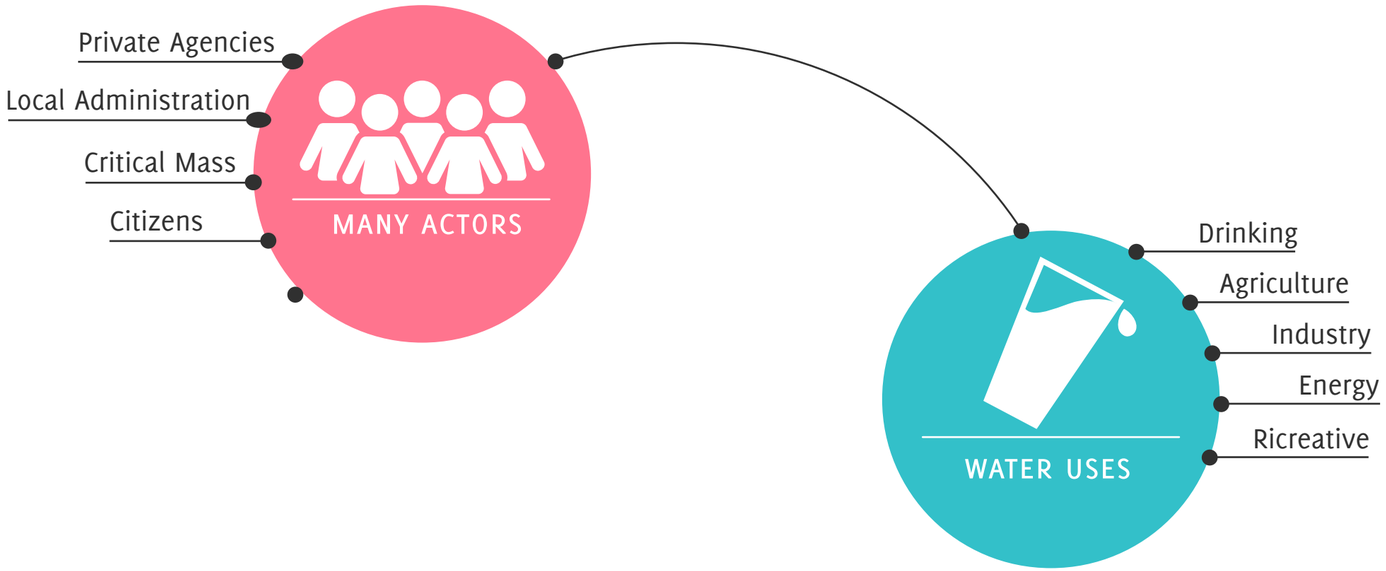

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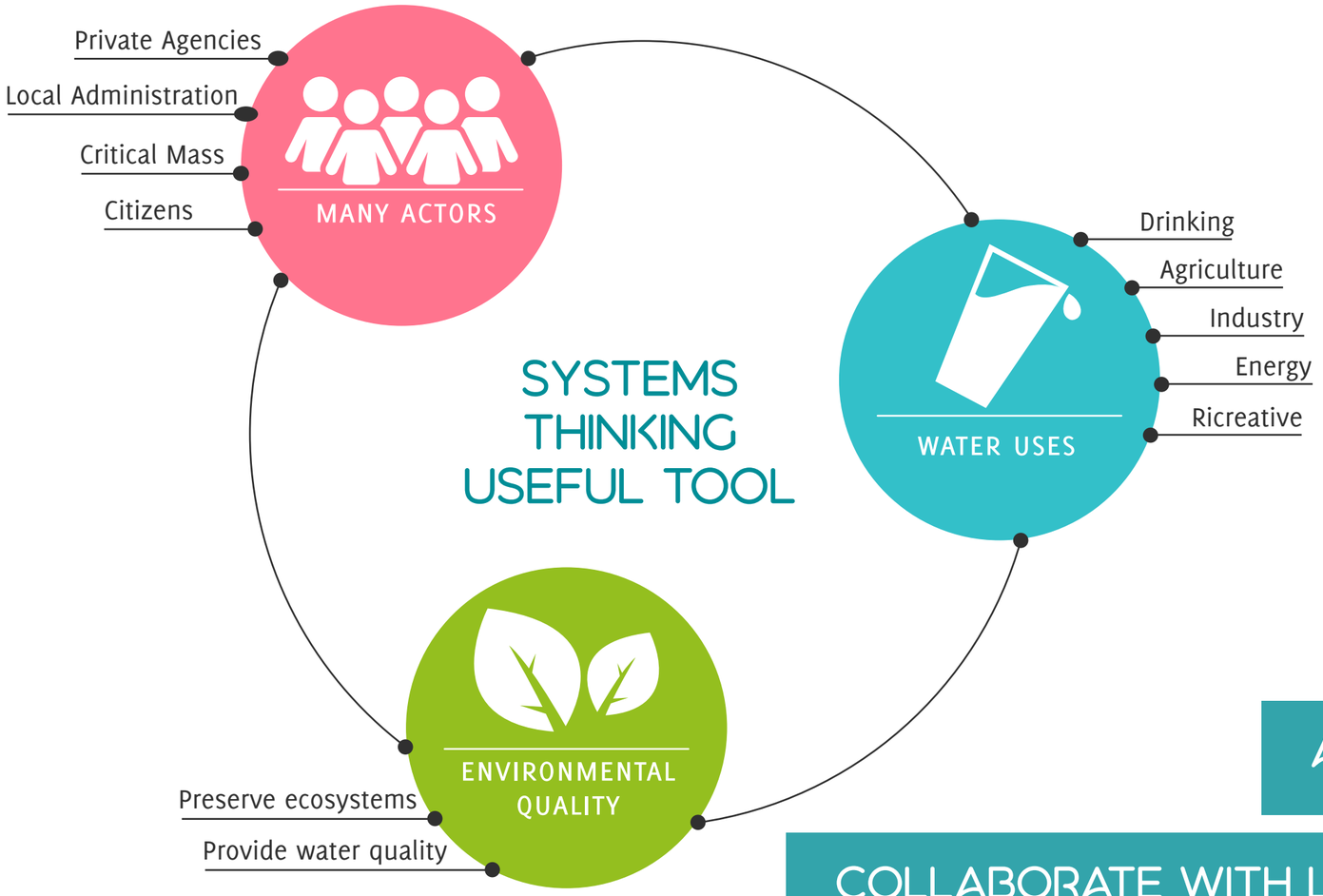

SYSTEMS THINKING USEFUL TOOL

ACT ON POLICY MAKING

COLLABORATE WITH LOCAL ADMINISTRATION

THANK YOU
FOR THE ATTENTION

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