

Development of a Case Study for Eco-Industrial Park Deployment under Uncertainty, ESREL, 2015

E. Kuznetsova^{1,2} & E. Zio^{1,3}

¹ Chair on Systems Science and the Energetic Challenge, Foundation EDF, CentraleSupélec, Paris, France

² Paris Saclay Energy Efficiency (PS2E), Research and Education Institute, Les Loges-en-Josas, France.

³ Dipartimento di Energia, Politecnico di Milano, Milano, Italy

ABSTRACT: Eco-Industrial Park (EIP) deployment consists in the creation of physical connections (for example, by a pipeline network) among individual industrial companies (or Individual Actors, IAs) situated in the same geographical area of a city, region etc. These physical connections are used to transmit energy/material sources generated by some IAs to other IAs, which need this energy/material to cover their sinks of their production processes and services. EIP deployment is driven by several potential benefits, i.e., improvement of IAs operational performance (increase of end product output), improvement of IAs economic indicators (increase of revenues) and decrease of IAs exposure to external risks (leading to energy/material supply shutdowns).

However, gain of these benefits depend on IAs internal and operational conditions, and other factors. Then, the opportunity of EIP deployment must be evaluated, going through the description of these conditions and factors, and the modelling of their influence on the potential benefits, in order to arrive at optimal choices of deployment.

In practice, several uncertainties exist in both the description of conditions and factors, and in the modelling of their impact on the EIP. In order to address the above aspects, methodological contributions are required in (i) modelling and developing of a realistic case study and (ii) optimization, both in presence of uncertainty. This paper addresses the modelling direction and aims at developing an industrial case study for Eco-Industrial Park (EIP) deployment, under uncertainty. The case study includes the models of IAs providing the amounts of energy/material inputs and outputs, economic factors and indications about IAs exposure to external risks. In addition, the scenarios of IAs operation are analysed.