

# The Mounds of Estremoz Marble Waste: between refuse and reuse

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## ABSTRACT:

Waste is commonly, considered an effect separated from the economic processes of production, construction, and consumption. This is seen both in the politics of recycling and in the legal apparatus regarding the reintegration of industrial wastelands, in the aftermath cessation of the exploitation. Consequently, this management represents merely the ‘after’ attempts that try to minimize the effects of waste negatively affecting our lands and lives.

In contrast, this paper addresses the interdependence between production and waste by making visible the ‘mounds of marble waste’ in Estremoz Anticline (Alentejo, Portugal). These mounds of marble waste allow us to demonstrate that the intervals of ‘artificial time’, as explained by Cedric Price (1996), that is, that use, reuse, mis-use, dis-use, and refuse, are not only successive but coexistent (Kümmel 1968).

## 1 INTRODUCTION

To reveal the interdependence between production and waste, this paper’s argument is structured in three parts: (a) in ‘marble waste, between refuse and use’ we show the mis-use of this natural resource, as confirmed by a simple statistic. From all the matter extracted from Estremoz Anticline, only 10 to 20% is used in construction; the remainder (80 to 90%) (Ribeiro 2011) is refused and accumulated in mounds of marble waste close to the extraction quarries; (b) in ‘marble waste, between dis-use and reuse’ we highlight that the found matter has a strong economical and social potential through reintegration into the productive system, namely by creating innovative products for construction; and finally, (c) we argue that ‘waste in transit’ reclaims the urgency of considering a cyclical and coexistent strategic approach to waste, through the interconnection of the intervals of artificial time, as an open-ended process.



Figure. 1 The Marble Waste Mounds of Estremoz Anticline.

## 2 MARBLE WASTE: BETWEEN REFUSE AND USE

The Estremoz Anticline mining industry is predominately one of extraction and manufacture of marble. The stone exploitation in this region recalls ancient civilizations. In fact, the first known reference to the use of marble refers to a tombstone ordered in 370 BC by the Carthaginian Captain Maarbal (Luz 2005). Nevertheless, it was mainly between the decades of 1930-90 that the level of production grew substantially to "concentrate more than 99% of the total active marble quarries in the country" (Luz 2005). Consequently, this industrialization process manifested a strong economic, social, and environmental impact on this territory, continuously reshaping its landscape.

The extraction areas are predominantly surrounded by removed stone that is considered worthless from a commercial point of view. These rock fragments that jointly represent 80-90% (Ribeiro 2011) of the extracted marble is usually set aside to contiguous areas and accumulated in piles, thus erecting artificial mounds. Furthermore, refused marble amounts to an expectant 50 million tons of still-waiting raw material (Ribeiro 2011). Considered together, this unused marble represents approximately 178 heaps in this region. As a result, the matter transferred from deep beneath the earth to the surface creates a "second nature" (Beigel & Christou 1996) landscape of holes and mountains. This landscape mutation is represented in three case-study territorial sections (Fig. 2) that make visible the noticeable topographic variation (registered between 2003 and 2014) (Esteves 2015), caused by the transition between the excavation and deposition processes and the soaring prominence of marble waste production. These mounds of marble waste are essentially elements characterized by a strong volumetric presence, reaching heights above dozen of meters, depending on the level of stone waste.

The considerable dross of marble matter reveals the questionable sustainability of this natural resource exploitation. For example, in 2001 the Anticline of Estremoz reported a rubble production of 1,485,100 m<sup>3</sup>, a very significant value, taking into account the production of marble blocks (ready for trade) of that year (222 700 m<sup>3</sup>). Perhaps if this earth-place had not been so generous, both in the quality of this geologic resource and in its dimensions — 40km long per 7 km wide, men would have already thought about how to waste less matter, imagining alternatives to reintegrate it into the economic cycle of production. In that sense, in 21<sup>st</sup> century ecological concern, refused marble is not only an egregious waste of a natural matter; but simultaneously a waste of land and water, which leads to serious implications in agriculture production and obviously in all living system, including human cycles of life. As Kevin Lynch points out: "wasting is useful where it supports life and its development, and wasteful where wasting is blocked, accumulates in toxic form, or causes a loss of organic material" (Lynch 1990).

*But what to do with this waste?*

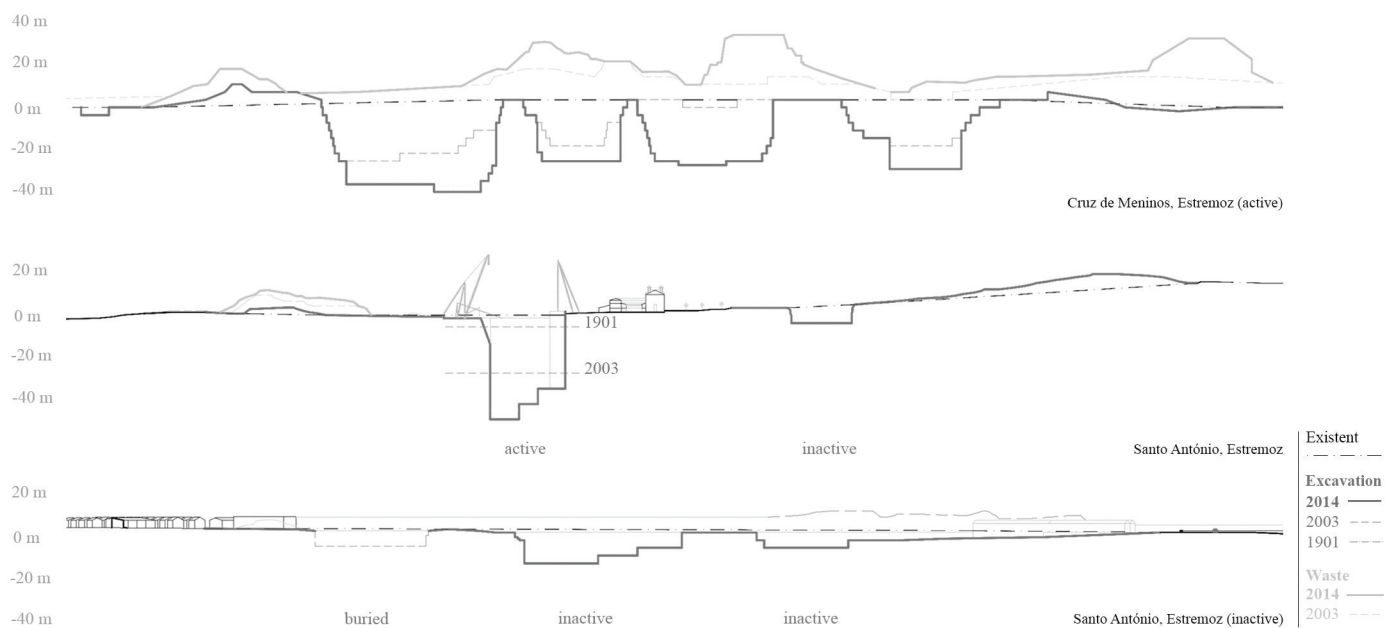


Figure. 2 Between Refuse and Use, Landscape Mutation.

### 3 MARBLE WASTE: BETWEEN DIS-USE AND REUSE

The current economic context reflects the need to ensure and develop new approach strategies to reuse or use better existent resources. In the Estremoz Anticline region, the potential of waste as a construction material has been undervalued. Due to this fact and to the major scale of this dis-use we explored (Esteves 2015) in partnership with the Department of Civil Engineering of Minho University and CVR [Centro para a Valorização de Resíduos], the hypothesis to create a new construction material, *Marcrete*, mainly fabricated with marble waste and concrete. Moulded with existing raw materials, this newly created material reintroduces refused matter into the cycle of production.

Fundamentally, this solution aims to demonstrate the opportunity and priority of considering the huge waste produced by this mining industry as valid matter for the manufacture of new materials, with applications in the architectural context. Due to its environmental approach, *Marcrete* can also be integrated into the Environmental Landscape Recovery Plan [PARP - Plano Ambiental de Recuperação Paisagística]. Although the reintegration of industrial wastelands, after the cessation of the exploitation, is compulsory, examples of such practice are lacking in this territory. Thus, in the case of Estremoz, the demand for new industrial approaches based on the reuse of the waste produced by the marble industry and the reintegration of abandoned extractive areas is urgent. Moreover, *Marcrete* incites a strategy based on permanent acting-cycles, creating a cross-protection system that ensures greater productive incomes and less environmental dis-use.

*Marcrete* is one of several possibilities that need to be explored to resolve the waste issue. More than finding 'the' solution, the aim is to demonstrate the potential of reusing this existent dis-used matter, to act simultaneously as a stimulus for a reconfiguring of local companies. Strategically, we also point out the relevance of adopting synchronic strategies to reuse the refused matter, rather than the embedded one that considers waste in its linear succession: that is, reuse follows dis-use which follows refuse. This would not only prevent the escalation of the spoiled land and matter, but more importantly it would integrate the interdependence between production and waste.

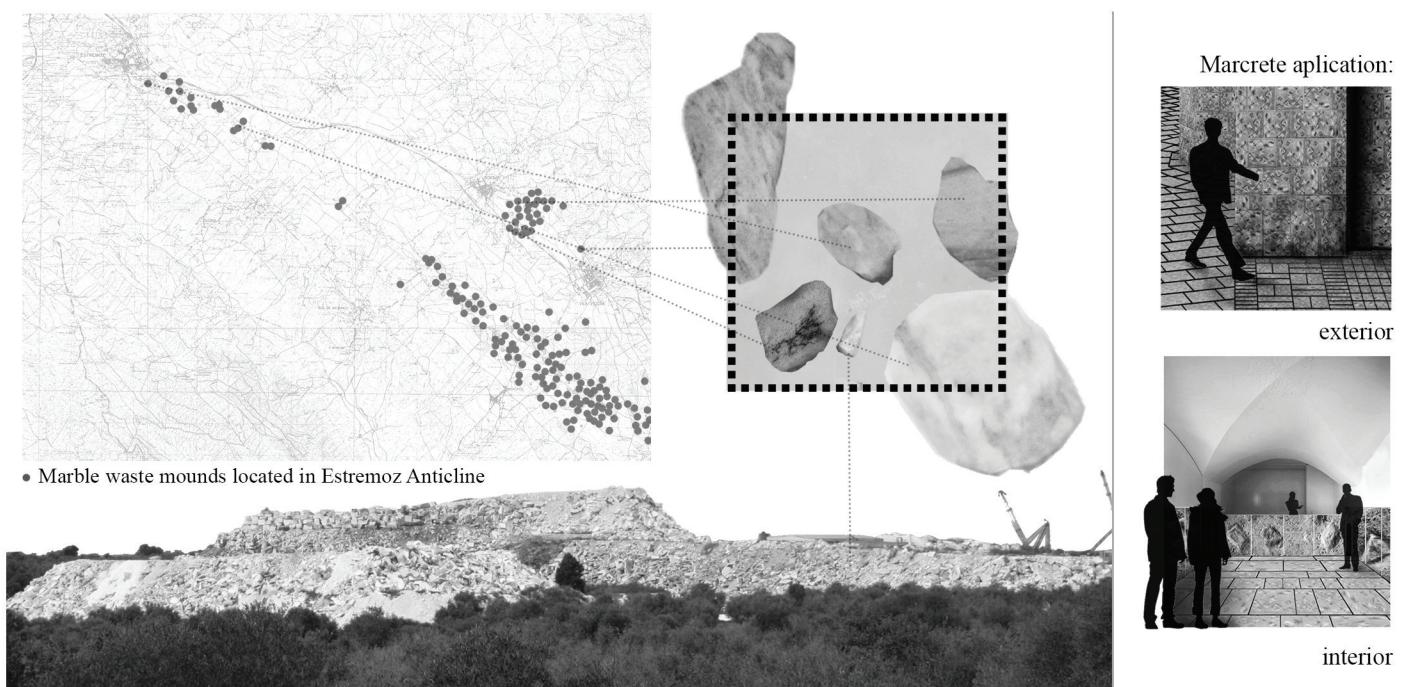


Figure 3. Marcrete.

#### 4 WASTE IN TRANSIT

As long as we keep looking at the question of quarry wastelands as something that needs to be taken care of 'after' the end of the production cycle we are losing sight of the big picture and only implementing superficial and aesthetic measures. To date, this remains the anachronous discourse and law apparatus regarding these areas of land. To hold onto an ideal image based on a naïve belief in the reversibility of long-time processes of exploitation of the earth by filling the hole of years of extraction, is no longer possible.

Jeremy Till (2009) states that "Architecture is no more than waste waiting to happen," pointing out that "demolition and construction, waste and order are kept apart through disciplinary policing of the boundary between the two." This implies that building and decay are not opposites but a transitory state 'in-between,' through which waste becomes. Applying Cedric Price (1996)'s intervals of 'artificial time' – use, reuse, mis-use, dis-use and refuse – to the marble exploitation in Estremoz Anticline reveal the paradoxical nature of time – not only successive, but coexistent (Kümmel, 1968) – that has been generating this second nature landscape.

If this is the case, is it not time for protection and recovering landscapes policies to be more than an 'after action', one that re-acts to the inaction of a dis-used matter caused by the mis-use of this precious geologic resource, that represents 80 to 90% of extracted matter?

Production and waste are interdependent, and a strategic approach is also needed. As Sir Geoffrey Vickers (1968 cited by Price 1996) states, "There are many situations in which to be systematically late, is to be systematically wrong." This is the case of Estremoz Anticline wastelands: they have been waiting for a long time for something to be done to "Maintain reversibility in the short run and open-endedness in the long; don't put out more than the context can absorb. The greatest wastes occur when species and cultures are extinguished. Decline and death on the other hand, are normal and life-enhancing. (...) We should value a connected flow: of matter, of energy (Lynch 1990).

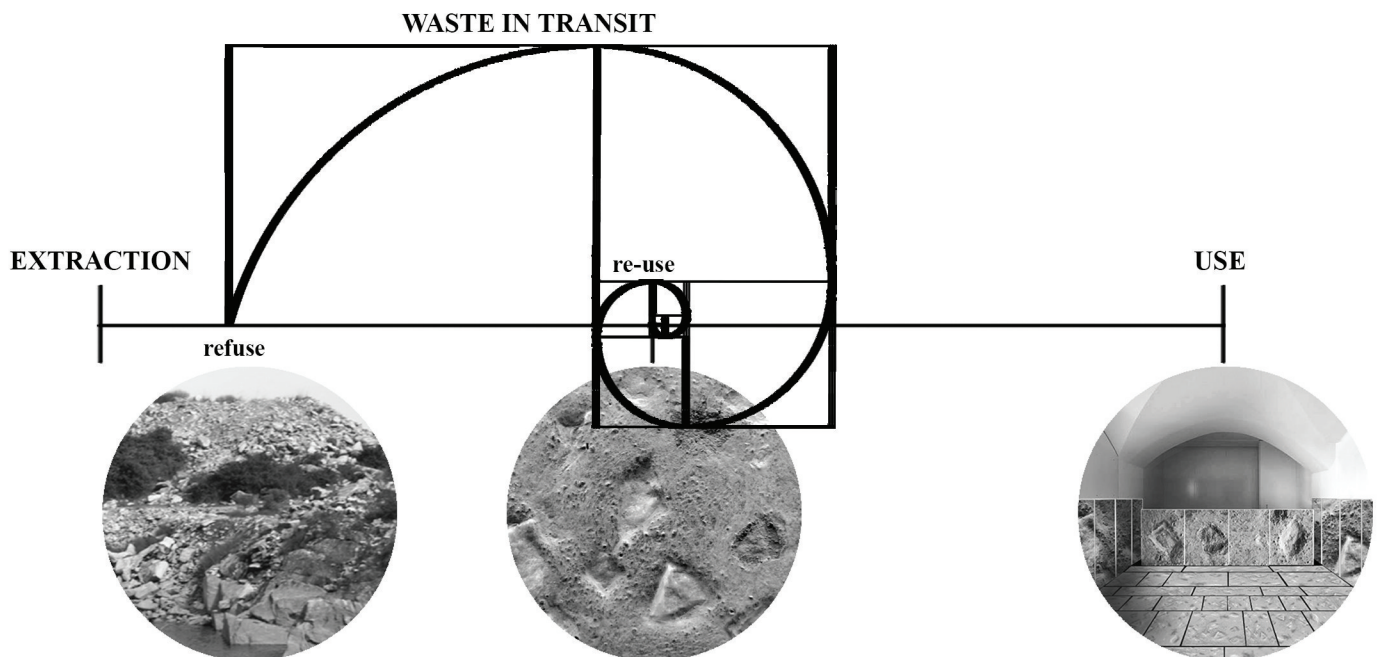


Figure 4. Waste in Transit.

## 5 CONCLUSIONS

*What to do with the mounds of waste in Estremoz Anticline?* In this paper, we have brought visibility to the mounds of marble waste in Estremoz Anticline, generated by the continuous flow between extraction-deposition, between use and refuse, between refuse and mis-use, and between dis-use and reuse. Furthermore, by highlighting the principle of interdependence between production and waste we have reclaimed the urgency for cross-actions between the two, coexistent in time.

There are eight practical benefits of *Marcrete*, the proposed innovative material that could to solve waste in Estremoz Anticline: (a) the reintroduction of refused matter into the cycle of production; (b) the ability to be moulded with existing raw materials; (c) it is simple to produce; (d) the use of pre-existent industrial infrastructures and tools; (e) low-cost production; (f) the contribution to the increase in the productivity generated by the extracted mineral resources; (g) the addition of diversification to the business segments where this sector competes; and, (h) the reduction of the environmental impact of this dis-use waste.

Lastly, the *Marcrete* example has been introduced as a stimulus to trigger the active reuse of these huge piles of waste; but we argue that what is more important is to incite a more interconnected way of taking care of the earth, one that creates less wasteful waste.

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