Architectural Histories

Arnórsson, ÓÖ, Kalfa, K and Pohl, D. 2025. The Aluminum Curtain: Bauxite and Housing as Strategic Mediators between the Mediterranean and the 'United States of Europe'. *Architectural Histories*, 12(1): pp. 1–22. DOI: https://doi.org/10.16995/ah.15137

# The Aluminum Curtain: Bauxite and Housing as Strategic Mediators between the Mediterranean and the 'United States of Europe'

**Óskar Örn Arnórsson,** Iceland University of the Arts, Iceland, oskarorn@lhi.is
**Konstantina Kalfa,** Institute for Mediterranean Studies and Athens School of Fine Arts, Greece, kkalfa@asfa.gr
**Dennis Pohl,** Flanders Architecture Institute, Belgium, dennis.pohl@vai.be

As the Cold War loomed and debates on European unity took shape, Greece stood at a crossroads. This paper focuses on a moment when US-forged 'strategic dependencies' transformed rural Greece into a cog in the capitalist machine. The country's natural wealth, particularly its rich bauxite reserves, fueled Western Europe's recovery, but shipping it out of the country stifled Greece's own industrial ambitions. This moment marked a redefinition of architecture as both a tool and a symbol of constrained growth — a pattern that persisted globally throughout the so-called developing era. Far from being a deliberate engine of growth, housing reconstruction emerged as an ad hoc mechanism to address the era's conflicts and sustain economic activity because early housing schemes were framed as tools for import substitution and investment. Corrugated aluminum sheets — previously used in the construction of military barracks and thus considered a wartime relic — were now used for the first time for domestic roofing. Recommended by US housing specialists, their use epitomized the constrained agency of housing reconstruction in post-WWII Greece. In this case, architectural materiality also stands for the stark disparity, recently raised in seminal studies about the 'Age of Aluminum', between resource-extracting peripheries and the consumption-driven cores of modernity.

**Keywords:** Greek Reconstruction; aluminum; bauxite; Constantinos Doxiadis; Germany; US Aid

## Introduction

An archival photo dated August 17, 1951, shows two US officials and a Greek industrialist standing, neckties and all, on a vast stockpile of bauxite (**Figure 1**). This is the last image in a picture series called 'U.S. Receives Aluminum Made in Germany with Greek Ore', one of dozens of picture series about Greece and the Marshall Plan (MP) that is now in the 'Marshall Plan Pix' file at the US National Archives.[1] Each series in the file begins with an introduction. The introduction to 'U.S. Receives Aluminum' says that, despite this pictured abundance, Greece lacks the electric power required to turn bauxite into alumina, the basic component of aluminum production. Greece must therefore export the bauxite to Germany for processing, 'from where the alumina is shipped to the United States' (Greece Index and Pix File: 295). Having been newly secured for the West through anti-communist interference of the US in Greece's Civil War, Greece was now being asked to do its part in Western Europe's industrial recovery.

**Figure 1:** 'Standing on top of one of the bauxite stockpiles, ECA officials survey the Mediterranean. Only three miles from the main site of the mine, the ore is loaded here directly to ocean-going vessels'. Part of the picture series 'U.S. Receives Aluminum Made in Germany with Greek Ore', National Archives at College Park, College Park, MD, 286-MPX-Greece, Volume 1, p. 207.

This paper follows the trajectories of both post-WWII financial aid and minerals as they flowed in and out of Greece, tied to the parallel discourses of emergency housing in the country. It explores how the movement of aid and minerals determined Greece's place in the era's international division of labor: a separation of regions that produced resources from those that were industrialized, Greece being one of the former. Bauxite

was a material of burgeoning significance in post-WWII markets. In the interwar years, when an abundance of bauxite was first discovered in Greece, a great debate ensued in Greek society about the capacity for ores to lay the foundation for the country's industrialization, which could help Greece avoid being designated as simply an exporter of raw materials (Kakridis 2009; Papastefanaki 2013: 160). The discussion continued into the post-WWII era, but with a different slant because it now included the Americans involved in administering the Marshall Plan.[2]

While the debate developed, however, emergency housing in rural Greece acquired a more prominent role in economic and industrial policies. Encompassing both formal top-down design and the orchestration of informal bottom-up building activities, as well as locally sourced building materials such as stone, housing reconstruction became pivotal to the country's development plans to boost the economy, in line with American Cold War politics.

One of the few imported building materials in Greek reconstruction schemes was corrugated aluminum for roofing, a material favored because it was light and thus ideal for transport via mules to mountainous villages where it was a low-tech solution (**Figure 2**). In one of the first uses of the roofing sheets for housing purposes,

**Figure 2:** Preparing aluminum roofing material for transport through the mountains of Greece. The image, from Speer (1953: 53), is accompanied by this caption: 'The materials: Timber from France, Canada, the United States — nail wire, roofing tiles, corrugated aluminum from the world markets — all these materials were shipped into the mountain village areas and, from then on, the job of getting these shipments to building sites was left to donkeys — and to men, women, and children'. Courtesy National Association of Housing and Redevelopment Officials (NAHRO).

an advanced material — corrugated aluminum sheets — was thus downgraded to fit traditional building techniques that engaged local labor.

Our use of the term 'Aluminum Curtain' therefore refers both to Greece's position at the Mediterranean edge of the 'Iron Curtain' and to the broader geopolitical context. By replacing 'iron' with 'aluminum', we highlight the era's focus on European economic integration and market efficiency. Within this framework, Greek bauxite and corrugated aluminum emerged as transportable products, symbols of modernization, yet their extraction and circulation also created new divisions and exacerbated inequalities, ultimately hindering the long-term development of heavy industry in Greece.

Our paper is structured along these lines into three sections, preceded by a brief geopolitical scene-setting. The structure reflects the larger narrative of how Greece's post-WWII economic development unfolded amid geopolitical pressures and a vision for a united Europe. The first section traces how the US-sponsored MP steered 'strategic dependencies' between the German aluminum industry and Greek bauxite exports, turning rural Greece into a node within the capitalist system and linking its natural resources to broader Western industrial recovery. The second shifts focus to housing reconstruction policies, demonstrating how Greece inverted the conventional view of housing as an economic burden and instead showcased the role of housing as a mechanism for economic growth. Finally, the third section analyzes the use of corrugated aluminum sheets as a roofing material for Greek housing and contributes to the historiography on how the post-WWII building industry domesticated wartime materials, practices, techniques and energy sources (Albrecht 1995; Colomina 2007; Cohen 2011; Kaplan 2011: 196; Van de Voorde, Bertels and Wouters 2015). Together, these sections illustrate the pivotal role of architecture, not only in shaping Greece's rural landscapes but also in driving its economic transformation amidst the geopolitical tensions of the Cold War and European integration.

## Geopolitical Context

After WWII, Greece, situated at the Mediterranean's edge of the Iron Curtain, became a theater for the containment of communism. As Britain's financial situation made its assistance to Greece and Turkey untenable in early 1947, the US stepped in through what became known as the Truman Doctrine, often seen as the opening salvo of the Cold War and the beginning of post-WWII US foreign aid policy. In line with the commitment the US had made to the two Mediterranean countries through its new foreign policy and

its support of the Greek royalist forces even before the outbreak of the Greek Civil War (1945–1949), the US included them when it launched the MP on April 3, 1948 (Liakos and Doumanis 2023; Gerolymatos 2016).

Historians have explained the MP in terms of a triad of political, economic and strategic aims (Hogan 1989: 26–28, 427–28; Steil 2018: 85–115). The political aim of the MP was to establish a European organization that would negotiate the amounts of aid requested and coordinate it between the recipient countries, forcing former belligerents to cooperate. This might bind them together in a 'United States of Europe', a vision that meant different things to different people at the time (Bromberger and Bromberger 1969). Such integration also had economic consequences. According to customs union theory, 'much in vogue at the time', the production of a US-style, continent-wide, tariff-free economic space would allow members of the union to capitalize on their comparative advantage without needing to produce everything domestically (Milward 2006: 44–45, 217–18). Finally, political and economic integration simultaneously fulfilled a strategic aim. Entities thus integrated would avoid war at all costs, allowing the US to stabilize them and secure their strategic resources for its side (Steil 2018: 42; Hogan 1987: 22, 26–28).

In the following decades, these three aims were fulfilled to varying degrees, and the extent to which the MP led to their accomplishments has been much debated (Burk 2001). They had important consequences for Greece, most of which go beyond the scope of this paper. Specifically for our purposes, however, Greece's political, strategic, and economic integration with Western Europe turned its rich bauxite reserves into raw materials for Western industrial giants, while stifling the development of its own heavy industry. For the next few decades, this cemented Greece's role in Western Europe's division of labor as a resource provider rather than an industrial power.

When the MP was announced in Greece, some people, including Constantinos A. Doxiadis, who at the time held leading positions in the country's various reconstruction institutions and services, thought Greece might use the aid not only to rebuild the country but also to leapfrog into modernization (Kakridis 2009). Mining Greek bauxite and processing it within Greece's shores was just such a use of aid, given that in 1937, Greece already ranked seventh in bauxite mining in the world (Batsis 1977: 117).

Soon, however, these plans shifted. The devastation in Greece was greater than in most countries on whose soil war had raged, so plans that were appropriate for other such countries were not sufficient for Greece. It also made little economic sense to provide aid for the formation of an aluminum industry in Greece, which the devastation of war had rendered poor in comparison to other countries. It was more economically

efficient to ship Greek bauxite to Germany, whose heavy industry was already a hundred years old and which had already been using Greek bauxite for almost ten years. It is through these strategic dependencies, particularly in the aluminum industry, that Greece's economy developed. The reliance on Greek bauxite for Germany's post-WWII recovery is a clear illustration of how geopolitical and economic priorities aligned in shaping Greece's industrial path.

## The German Aluminum Industry and Greek Bauxite Exports

During WWII, aluminum became indispensable to the production of aircraft, bombs, and other armaments. As a 1951 US pamphlet titled 'Aluminum for Defense and Prosperity' put it (in the context of the Korean War), 'aluminum has become the most important single bulk material of modern warfare. No fighting is possible, and no war can be carried to a successful conclusion … , without using and destroying vast quantities of aluminum' (Sheller 2014: 60). It is not by chance that according to a 1969 publication of the Aluminum Company of America, the only invasion on American land during WWII sought to damage 'as much as possible aluminum production in the United States', by destroying several plants, as the Nazi saboteurs themselves confessed when interrogated by the FBI (Sheller 2014: 70).

In fact, Nazi Germany had invested in aluminum production itself since October 1936, when it launched its four-year plan to strengthen and autonomize its economy. One of the challenges to the plan, and any future war effort, was the lack of bauxite within Germany's borders. Germany procured most of its bauxite from Hungary, but after 1936, it turned to Greece as well. From that year until the beginning of WWII, about 50% of Greece's production of bauxite went to Germany, although Greece was its least important supplier (Frøland 2013: 85–87).

When war broke out, Germany expanded bauxite procurement to supply its aircraft industry, peaking in 1943. Although Greek bauxite remained but a small fraction of overall German exploitation during the Nazi occupation of Europe, Germany envisioned massive investments into aluminum production through the occupation of Greece. Subsequently, German military economic staff prospected actively for deposits in Greece (Frøland 2013: 88–92, 98–99). When Germany withdrew from mainland Greece in 1944, it left Greek mines in a state of depletion and non-productivity (Sweet-Escott 1954: 126), rendering Greece unable to reinstate them after the end of WWII.

## Greek Bauxite Production with the Help of the Marshall Plan

In 1951, the Elefsina mine, on the western outskirts of Athens, became the sole bauxite mine to be reactivated with the help of MP aid (Mutual Security Agency 1952: 74). The occupying Germans had taken over the Mt. Parnassos mines, the most productive in

pre-war Greece, but as of 1955, these had not been brought back into production (United States Operations 1955: 7).[3] The MP support was divided into two categories: the first was MP loans and grants, which were designated for known ore reserves. This loan category resembled typical MP financial assistance offered to private industrial and agricultural enterprises. Once the feasibility of ore deposits for exploitation was confirmed, mine owners could request long-term, low-interest loans from the MP, which often required borrowers to contribute a portion of the total amount. Some loans were provided in foreign currency to facilitate machinery imports, while others were granted in drachmas from the counterpart fund for on-site construction (Mutual Security Agency 1952: 72).

The second category of loans did not come out of the Greek recovery program at all but were separate 'strategic material' loans, whose purpose was to 'develop and accumulate supplies of critically scarce materials for the U.S. stockpile, and essential to the defense needs of the West' (Mutual Security Agency 1952: 72). Unlike the first type, which required monetary repayments, these loans were to be repaid in full through annual shipments of raw materials. When the Strategic Materials division of ECA approved seven contracts with mining enterprises in 1951, the Elefsina mines of the Skalistiris Group was key in activating the bauxite supply chain towards West Germany. One year before, in 1950, the ECA confirmed that West German aluminum manufacturers could receive a loan of DM34 million (the equivalent of $8 million). This would allow West Germany to receive 450,000 tons of bauxite before 1953 so that it could produce 100,000 tons of alumina. Strategic stockpiling would allow the US to buy 17,000 tons of alumina, worth $8 million. Greece would in turn receive $1 million in Marshall aid to further support its bauxite exploitation (Sonderhilfe für westdeutsche Aluminium-Industrie 1950: 4).

The MP thus calibrated West Germany's post-WWII difficulties in obtaining sufficient bauxite quantities by making Greece a strategic supplier, especially after the ECA allowed West Germany to pay back the investments with alumina it had processed the bauxite. In this context, together with the US technical assistance program, the Institute of Geology and Subsurface Research was established in 1952, when it produced the first metallurgic map of Greece, with a subsequent one in 1965 (**Figure 3**). While the map and its legend are difficult to reproduce at this small scale, detailed maps such as this were instrumental for the exploitation of bauxite deposits. Greece's landscape was not just mapped horizontally but assessed vertically, enabling the efficient extraction of bauxite. This not only aided post-WWII recovery but also reinforced the vertical enclosure of Greece's mineral wealth: a process in which the subsoil is defined, visualized, and claimed for economic use. It echoes Çelik Alexander's insight that resources become valuable through specific socio-economic and political conditions — particularly those shaped by data collection, geological mapping and visual technologies.

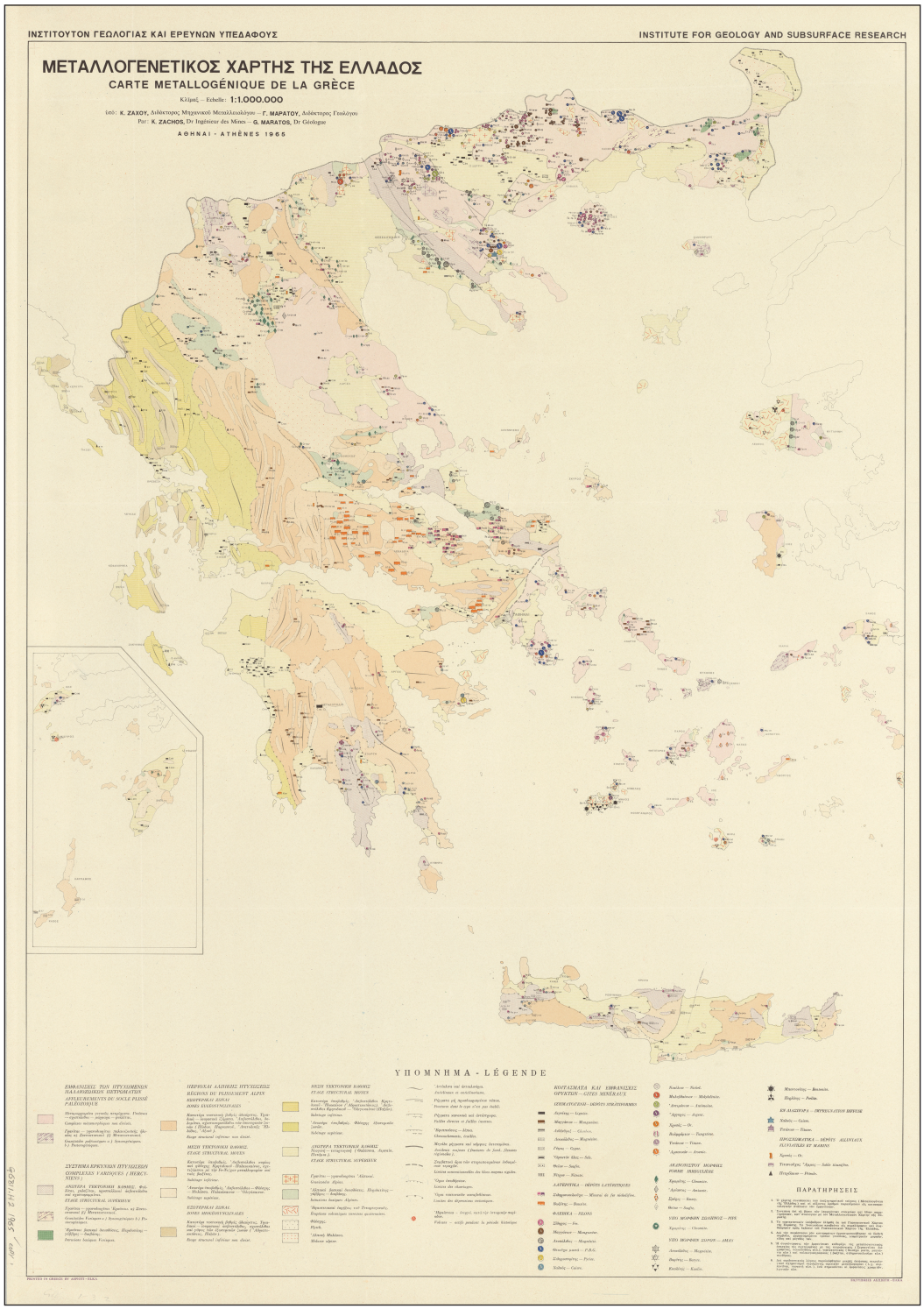


**Figure 3:** This map, created in 1965 by K. Zachos and G. Maratos at a scale of 1:1,000,000, was a product of the Institute of Geology and Subsurface Research (now the Hellenic Survey of Geology and Mineral Exploration—HSGME). © Hellenic Survey of Geology and Mineral Exploration—HSGME.

The broader implications of 'sectional thinking' demonstrate how modern resource management — from coal in Britain to bauxite in Greece — hinged on visualizing the earth in layers. Just as 19th-century Britain relied on geological sections to enhance mining efficiency, post-WWII Greece became integral to international supply chains through a similar lens, turning previously untapped earth layers into valuable resources for global markets. By using charts, maps, and drilling techniques, this approach augments the notions of land extraction into the vertical dimension, making visible the strata of the earth that can be processed into materials of the built environment. This underscores the intertwined nature of data collection, economic strategy, and material extraction that was crucial in shaping the built environment and continues to influence contemporary resource politics (Çelik Alexander 2023: 38).

## Housing as a Productive Sector for Greece's Development

While Greek bauxite ores were thus put into circulation for revitalizing the Western European economy, giving rise to heated political and economic debates within Greece about why the country could not exploit them for itself, housing reconstruction absorbed great amounts of MP aid. As the head of the Undersecretariat of Reconstruction, holding various posts during the first years of that period, Doxiadis was accused of advancing the interests of individuals who, like him, were entrenched in the construction sector (see, for instance, the points made by D. Philaretos as well as the journal *Eleftheria*, quoted in Politakis 2018: 206).[4] Recent critiques even suggest that US aid might have flowed more toward electrification and industrialization initiatives if 'influential groups' — of which Doxiadis was considered a key actor — had not intervened to divert it towards housing reconstruction (Politakis 2018: 262).[5]

These criticisms fail to acknowledge that Doxiadis conceptualized housing construction as a form of import substitution — of replacing foreign imports with domestic production — as well as a means for building savings and economic resuscitation. As early as 1946, Doxiadis had championed the advantages of investing in housing (1946: 13), which was different from the era's prevailing approach, wherein administrations in both developed and 'developing' countries, predominantly administered by economists, viewed the provision of housing as impeding rather than propelling economic growth (Harris and Arku 2005; 2006; 2007).

Doxiadis raised two key points about the value of investing in housing. He said that the planning of rural settlements could yield enhanced connections throughout Greece, facilitating the flow of goods and economic transactions (Doxiadis 1948a: 4). He also suggested that providing material and money for families to undertake reconstruction themselves could be a significant stimulus for augmenting families' savings, an amount he endeavored to estimate early in the period of Greek Reconstruction (Doxiadis 1948b: 1).

He even formulated the unconventional idea that house construction stood as the sole secure means to free these savings from stagnation and hoarding, since they could be channeled toward capital circulation in the market (Kalfa 2019; 2021). In August 1947, Doxiadis, in his role as Director General of Reconstruction, promulgated a decree that positioned building activity as a key instrument for economic development, with the following advantages: job creation, boosting the construction material sector, and growth in both ancillary craft industries and the purchasing power of a greater percentage of the population, creating multiplier effects in other productive sectors (Official Government Gazette A 184/23.08.1947; see Doxiadis 1947a; 1947b; 1950).

Behind Doxiadis and his team were American housing experts Jacob Leslie Crane, chief of the international housing office at the US Housing and Home Finance Agency (HHFA), and his associates George Reed and George Speer, who led the Greek Reconstruction initiatives. While American foreign housing aid inaugurated Greek self-sheltering schemes, so that its precise impact on geopolitics eluded predictions, American experts were unwavering in their championing of this cause. They did not support state-driven final housing solutions that were based on the western welfare state model. Instead, between 1948 and 1951, their assistance was steered toward privately led house-building endeavors. These were meticulously planned to ensure not only the externalization of reconstruction costs, by relying on local labor and locally sourced materials as well as the multiplication of private investments therein (Kalfa 2019; 2021).

From these experts' perspective, the use of such 'cheap' materials as stone not only served as a constant reminder of Greece's austerity conditions but also acted as a catalyst for national hope — akin to the role of rammed-earth techniques in self-help housing in India (Karim 2019). In the seventh of the twelve propaganda articles published on October 3, 1945, in the widely circulated newspaper *To Vima*, titled 'The Reconstruction — The Building Materials', Doxiadis stressed the possibilities of material autarky. 'If we want to reconstruct without damaging our trade balance or depleting our forests', he observed, Greece needs viable alternatives: stone, brick, and tile, 'easily crafted using just soil, water, and sunlight' as substitutes for timber, which 'makes up over 50% of the value of imported construction materials and more than 10% of their weight'; and iron. 'Since ancient times', Doxiadis maintained,

> we have never been rich in iron, and our people have created two perfect rhythms twice. Byzantine architecture, in particular, attained technical perfection, exemplified by the construction of the grand dome of Hagia Sophia without a single iron rod … Even today, there are corners of Greece where local artisans build without the need for either wood or iron. (Doxiadis 1945: 1)

Thus, the manifest vernacular form of housing cores, assembled through the extensive use of locally sourced stone (**Figure 4**), locally produced clay tile, and brick crafted according to regional traditions, showcased Greece's ability to stand on its feet even without having been industrialized.

**Figure 4:** Mining rock, c. 1946. Locals quarried stone without compensation, under the direction of the Ministry of Reconstruction. Photograph by Voula Papaioannou, 1945–1950. © Benaki Museum Photographic Archives.

## Golden Leaves

As reported in *Battle for Survival*, the weekly bulletin of the Greek Recovery Program Coordinating Office (established by Doxiadis at the Ministry of Coordination), 70.7 tons of corrugated aluminum sheets were procured, along with other supplies and equipment, during 1947–48 (that is, under the American Mission for Aid to Greece (AMAG)) (RPS 1951: 367). Two years later, under the MP, this supply increased twentyfold, reaching 1,530 tons in 1948–49 (valued at $57,817) and multiplying again to reach a value of $816,062 in 1949–50 (the highest value during that last year, surpassed only by timber).

These sheets were mostly destined for remote mountainous villages, transported, in the traditional way, by mules along rugged paths. Official accounts note that the locals even gave them affectionate nicknames, like ‘golden leaves’ (the Greek word φύλλα means both sheets and leaves), suggesting that the sheets were enthusiastically embraced by locals even though they were unfamiliar to them at the time (Papaioannou 1975: 156; Speer 1953: 51–56).

We have not uncovered any evidence regarding the origin of the sheets. According to the Official Notes of the Undersecretary’s Office for Reconstruction in 1946, timber was sourced from the US and Brazil, iron from the UK and Africa, and nails from Sweden (Ministry of Reconstruction 1950). The *Battle for Survival* the weekly bulletin of the Greek Ministry of Coordination, mentions that 44% of the aluminum imported until June 1949 came from the US (RPS 1949: 3). It is likely that the sheets were manufactured and procured by either Aluminum Corporation of America (ALCOA) or Reynolds Metals Co., both in the US, both in the forefront of the development of corrugated aluminum panels at the time. This hypothesis is supported by existing literature on the so-called Age of Aluminum, which lasted from the 1930s until at least the 1970s, during which a ‘rhetoric of enthusiasm’ about the material reigned (Sheller 2014: 8). Scholars discuss how military demands during WWII, along with the end of ALCOA’s monopoly, catalyzed a production boom. This shift was partly driven by the emergence of Reynolds Metals Company—founded in 1919 as the U.S. Foil Company by Richard S. Reynolds Sr., a nephew of R.J. Reynolds of the Reynolds Tobacco Company. Though not established by the tobacco company itself, Reynolds Metals became a major competitor to ALCOA. This led both companies to launch a sustained campaign for the widespread peacetime use of aluminum, including in architecture and housing (Doordan 1993: 44).

These efforts were preceded by flagship projects from major architectural figures such as Walter Gropius and Buckminster Fuller (Wilquin 2001: 26; Sheller 2014: 135–39). Discussions on the functions of aluminum also appeared in seminal periodicals such as *Architectural Record* (‘Small Shops’ 1929; ‘Van Nelle Tobacco Factory, Rotterdam’ 1929) and *Architectural Review* (Brooke 1937), while the milestone International Style exhibition that inaugurated MoMA’s architecture department in 1932 showcased Albert Frey’s Aluminaire House that was clad with four-by-five-foot corrugated aluminum panels (Jandl 1991). These were closely linked with the modern movement’s quest for speedy mass-production at low cost, producing a distinct modern aesthetic. More refined developments soon followed, such as Frey’s Californian houses in the 1940s that were built with corrugated aluminum siding and roofs, which illustrated the then-emerging American Dream, as well as the Aluminum City Terrace for an Alcoa

plant (1941), designed by Marcel Breuer and Walter Gropius. As early as 1953, the first aluminum mobile homes began to appear in the United States.

Moving from experimental to widespread uses, the 'Age of Aluminum did not just happen; it was designed to happen', as Dennis Doordan observes (1993: 49). From the early 1950s to the 1960s, the industry persistently worked with leading designers to help them understand the material's properties and invent new ways of using it (Sheller 2014: 123). The efforts culminated in a full demonstration of aluminum's potential at Alcoa's 31-story headquarters in Pittsburgh (1952–53) and a handful of subsequent iconic landmarks, such as Pittsburgh's Hilton Hotel (1959).

As far as housing architecture is concerned, at that time, aluminum was not widely seen as fulfilling the aesthetic requirements of US homeowners. This was the finding of several graduate studies published at Iowa State College in 1951 as part of 'Project 1011: The Utilization of Aluminum and Aluminum Products in Farm Buildings and Equipment', an initiative sponsored by Alcoa to find peacetime uses for the metal and launched at the Iowa Agricultural Experiment Station in March 1947. The studies suggest the lightweight material be used to roof farm buildings, addressing the post-WWII scarcity of other roofing materials for outdoor storage and farming, such as galvanized steel (Walpole 1952; Hodges 1951: 1, 8) (**Figure 5**).


**Figure 5:** Two-page advertisement from 1949 for Alcoa Aluminum Roofing Sheets, Pittsburgh, PA, showing a tractor and a new barn roof being built. *Farm Journal* 17, no. 10 (October 1949). Reprinted with permission of *Farm Journal*, January 30, 2025.

At the same time that the aluminum industry was funding research into possible applications of corrugated aluminum for domestic purposes, an article was published in the *HHFA Technical Bulletin* titled 'Accelerated Weathering Test of Treatments, Priming Coats, and Finish Paint for Aluminum Sheet Metal'. The aluminum panels that the article discusses were manufactured by Reynolds (Petersen 1951). The HFFA, where Crane, Reed and Speer all served, was thus clearly preoccupied with aluminum for dwelling construction, just as the researchers at Iowa State College were.

As the above shows, there was a surplus of corrugated aluminum in the short period between 1947 (when the Iowa project begun) and 1951 (when the Korean War channeled aluminum back into war production) (Hodges 1951: 8). During this period, the HHFA therefore proposed aluminum for roofing farm structures in the US and for housing in the developing world (by the HHFA). A third-worlding aspect is at play here: a corrugated aluminum roof that was fit only for animals in the US was fit for humans in Greece, where locals had to deal with the material's lack of thermal insulation (Papaioannou 1975: 156). It is only logical that when Crane and Reed attempted to implement long-term aluminum roofing schemes, by shipping over 19,000 sheets to Burma in 1953 (while the US continued to support KMT forces in the country), the Burmese government did not buy into it as they 'had no psychological connection to an improved housing type' (Kwak 2015: 72–73).

This did not impede Charles Abrams, working for the UN and another key housing advisor of that era, in including corrugated aluminum sheets for what he called 'roof loan' programs, whereby national agencies and the UN made aluminum roofs available to families at reasonable costs in Ghana in 1954 and recommended the same for Bolivia in 1959 and Nigeria in 1962 (Abrams 1964: 110–15) (**Figure 6**). Roofs usually are the most expensive part of a house, and Abrams justified the provision of aluminum sheets by saying that 'a poor man often talks of his yearning for a "a roof over his head"' (110). Aluminum sheets were relatively cheap, and their handiness and easy assemblage would secure this prime element of a shelter. The rest of the structure, he argued, could then be built gradually by the future resident, using their own labor, savings and locally sourced materials. In other words, for Abrams, and other housing advisors like Crane, aluminum sheets were instrumentalized for their potential to trigger local self-help efforts and hope, rather than in their full prefab capacities for packaged houses. Abrams also observed that prefabricated houses made of aluminum had not yet been fully developed:

> Aluminum manufacturers in the United States and Canada, looking for new outlets for their merchandise, were hawking the virtues of aluminum prefabs as the solution to the world's housing shortage in the underdeveloped as well as the developed countries. They were peddling a final answer long before they had perfected the product or established low or competitive costs. (Abrams 1964: 167)

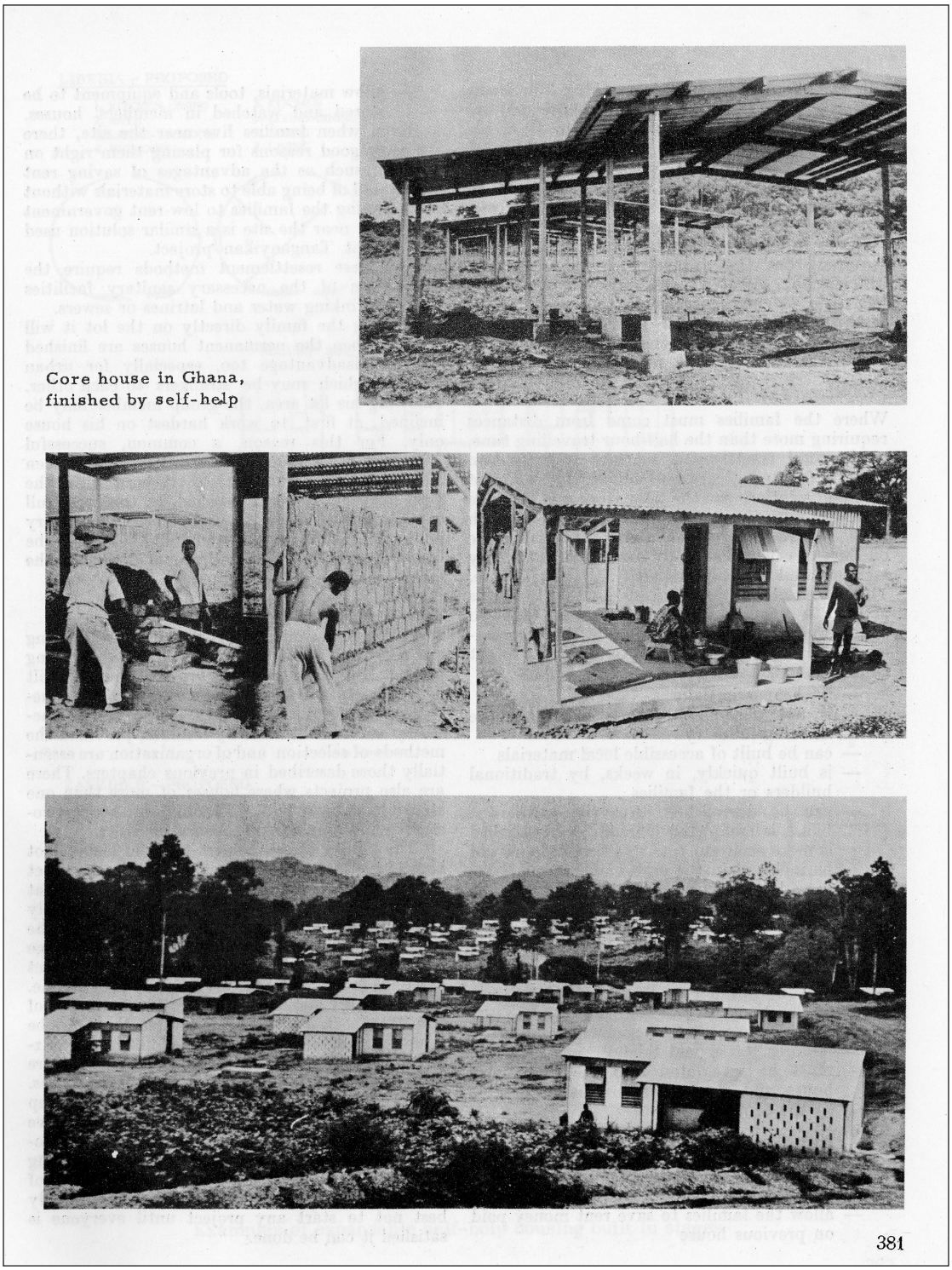


**Figure 6:** 'Core house in Ghana finished by self-help'. This page, showing roofs being constructed in Ghana, is from the *Manual on Self-Help Housing* published by the United Nations' Department of Economic and Social Affairs in 1964. Doxiadis also published the manual in an issue of his journal *Ekistics* (UN 1964: 381). The images are used to illustrate Abrams's roof loan program in Ghana, where the UN procured aluminum sheets for roofing. © Constantinos & Emma Doxiadis Foundation.

Therefore, until aluminum lost its gleam in the 1970s, when 'the neotechnic era faltered just at the moment of the oil crisis', it was sometimes scarce, sometimes abundant, useful in both war and peace, and appearing in many guises, be it as a component for a bomber, a skyscraper, or a roof in a village in Greece or Ghana, a testament to its apparently limitless malleability (Sheller 2014: 118). This malleability masked the fact that aluminum came out of the earth as bauxite, a mineral that was secured through political, economic, and strategic means. The history of bauxite mining and aluminum roofing in Greece, where aluminum sheets were, as explained above, likely used in one of the earliest experiments in aluminum-based housing aid, provides a valuable lens through which to revisit the geopolitics of aluminum in the mid-20th century. This case contributes to a growing body of scholarship over the past decade on the history of the material, including Sheller's *Aluminum Dreams: The Making of Light Modernity* (2014) and the edited volume *Aluminum Ore: The Political Economy of the Global Bauxite Industry* (2013), that emphasizes the disparity between 'backward' mining regions (Global South regions such as the Caribbean, Guinea, Jamaica, India, and Australia) and the Western spaces of modernity actively engaged in consumption.

## Postscript

By the 1960s, the significance of Greek bauxite mines for global aluminum companies had diminished. The race among major aluminum producers to secure bauxite deposits in Africa, the Caribbean, and Oceania made Greece's bauxite less desirable. One result, for example was the creation in 1956 in Guinea, a French colony in West Africa, of the aluminum company Compagnie internationale pour la production de l'alumine. The German company Vereinigte Aluminium-Werke AG (VAW) joined this consortium in 1958, securing its involvement after the German government guaranteed the investment. Even though the project initially faced challenges from the newly independent Guinea government, a satisfactory agreement was eventually reached a decade later, in 1966. Bauxite supplies from Guinea were expected by the early 1970s, highlighting the VAW's efforts to ensure a stable and diversified bauxite supply.

By that time, Greece had moved from 'colonial' relationships to being part of a polity of which it was a full member. In 1960, negotiations had begun between the French company Pechiney, one of the world's leading aluminum producers, and the Greek state regarding the establishment of the first domestic processing company for Greek bauxite. These exploratory discussions eventually engaged other players. While Pechiney discussed the terms with the Greek government, a Greek delegation went on an official visit to West Germany, where it met with the VAW, encouraging the Germans

to consider submitting an offer. Although the VAW rejected the proposal as unfeasible, Reynolds International Inc. stepped in and, reaching an agreement with Pechiney for a joint undertaking of the investment, managed to hold 17% of the share capital and three members on the board of directors of Aluminium of Greece, the subsidiary company eventually founded in 1961 (Kostis 2013: 80, 82, 86, 120).

At the request of Aluminium of Greece, Doxiadis Associates designed the workers' settlement Aspra Spitia, in Viotia, completed in 1965. This project has been characterized as Doxiadis's 'only European example of a complete realization of his ekistic theory' — one of the few centrally planned housing complexes in the country, constructed by industrial methods. Operating under favorable terms for bauxite exploitation, which included the supply of defiantly cheap electricity by the Greek state, Aluminium of Greece functioned during a period when it could not possibly effect any structural transformation of the Greek economy. Nevertheless, one might expect that Doxiadis would architecturally convey the era's expectations for progress surrounding the Aspra Spitia project. Instead, what he delivered was one- to two-storied houses that exuded a 'feeling of tradition' with their whitewashed stone walls, in the prevailing style of Greece's islands, plus a variety of traditional elements — some added by residents themselves, such as pergolas, flowerpots, paved streets, etc. In his own descriptions of the project, Doxiadis insisted upon qualities of ancient Greek towns, presenting plans of Aspra Spitia alongside those of the ancient Greek cities Olynthus (400 BCE) and Priene (350 BCE) (Zarmakoupi 2015). Once again, Doxiadis directed, and fostered, interest in city- and home-making traditions rather than the country's industrial progress.

Once the 2008 economic crash unveiled the fact that home-building and homeownership as a means of economic development came with strings attached (with mortgage loans left unpaid and heavy taxes on real estate), one of the celebrated films of the Weird Wave cinema, *Attenberg* (2010), used Aspra Spitia as the ideal setting to unfold its story of failed dreams for economic prosperity. In its exceptionality, this purpose-built town was employed in the film to foreground the shortcomings of a 'European' future for Greece, indefinitely suspended, as well as the dysfunction of the Greek family living therein (Poupou 2014; Eleftheriotis 2020), so long affirmed as the prime agent of national economic growth. Indeed, a photograph in Speer's report called *Aided Self-Help Housing Abroad*, published in late 1954, shows a rural family of three generations working in front of their newly constructed house that is covered by a corrugated aluminum sheet roof (**Figure 7**). The image sums up this account of the history of bauxite and housing in Greece as two parallel but mutually exclusive paths of development.

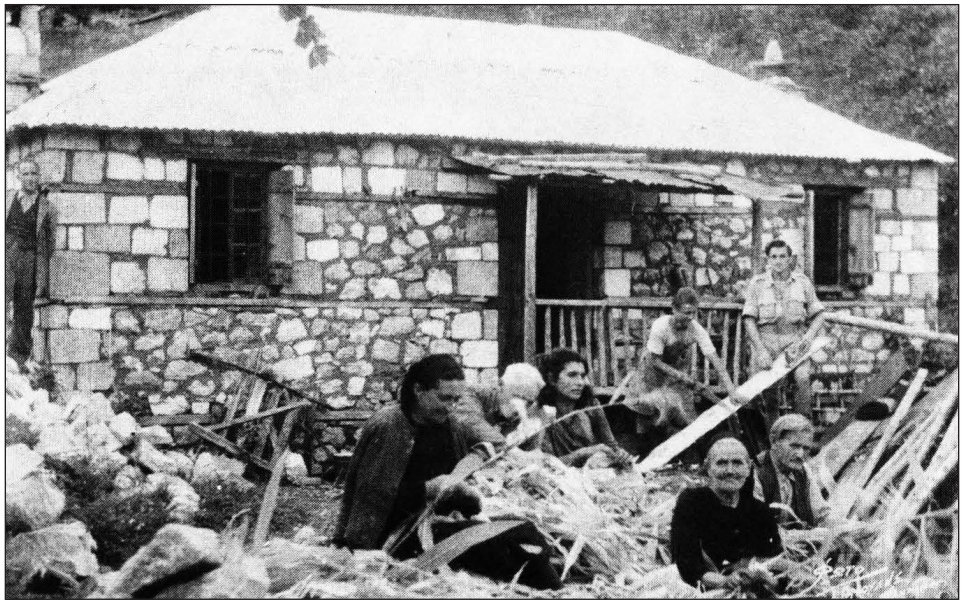

**Figure 7:** 'Life begins again for the seventy thousand Greek war refugee families who rebuilt their own homes under the aided Self-Help Housing Program'. The photo is from a report by the Housing and Home Finance Agency on US aid for shelter delivered to Greece, Puerto Rico, Taiwan, and Jamaica (HHFA 1954: 8).

## Notes

[1] The index lists 2,105 images of Greece alone. See Greece Index and Pix File (n.d.).

[2] The official name of the Marshall Plan was the European Recovery Program (ERP).

[3] We became aware of this source from reading Leda Papastefanaki's work (2013: 181). When we contacted her, she generously shared that it was kept at the Blegen Library in Athens, Greece.

[4] Engineers, urban planners, and architects became, through their formal professional association (the Technical Chamber of Greece), the most fervent supporters of the measures passed by the Ministry of Reconstruction (Kalfa and Theodosis 2022).

[5] George Politakis even maintains that Doxiadis was heading 'a powerful lobby' that deliberately delayed the enacting decree for the establishment of the Public Power Corporation that would supervise and operate the country's electric power program (approved by the Parliament in July 1950). According to Politakis, Doxiadis 'tried to block investment in power unless [the lobby] could control it' (2018: 245).

## Authors' Note

The authors express their gratitude to Leda Papastefanaki, Professor of Economic and Social History at the Department of History and Archaeology, University of Ioannina, for providing valuable archival material, and to Giota Pavlidou for her support at the Doxiadis Archives.

## Competing Interests

The authors have no competing interests to declare.

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