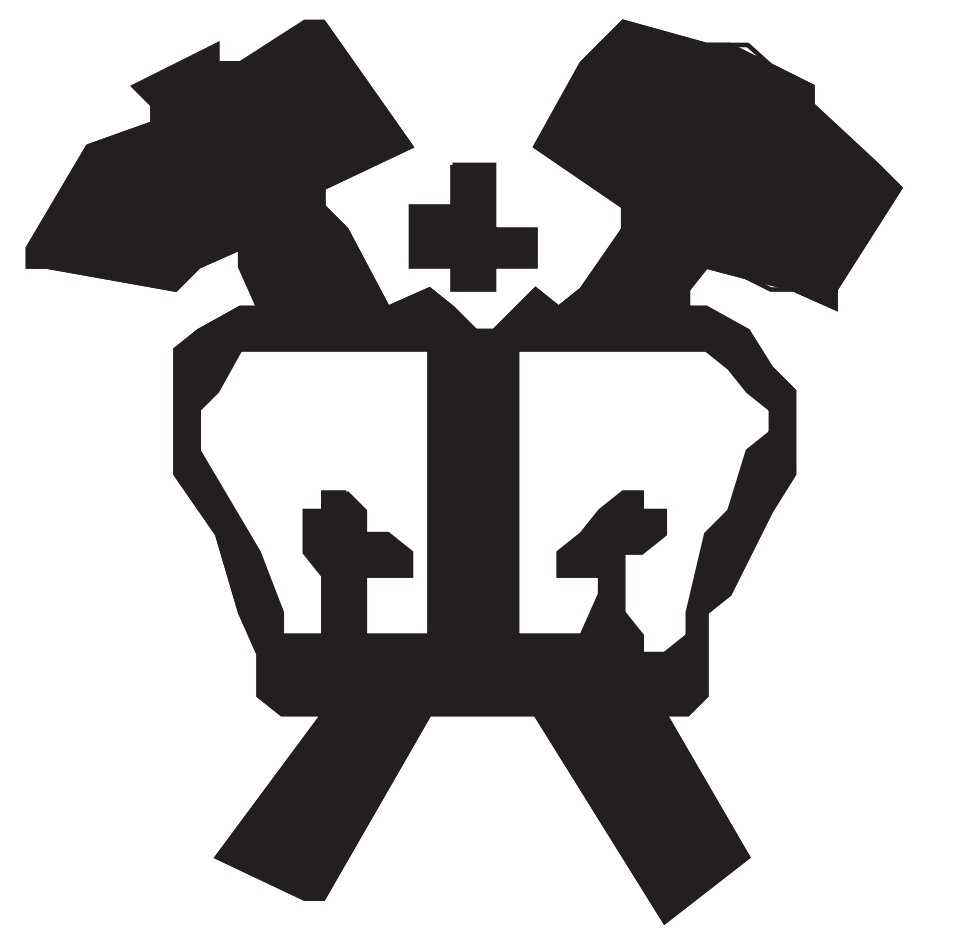




PROPOSAL FOR THE IMPLEMENTATION OF WASTE-TO-ENERGY IN ATTICA, GREECE

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THE MUNICIPAL SOLID WASTES (MSW) MANAGEMENT PROBLEM

Waste management in Greece has reached a critical point, because of lack of environmental consciousness and inadequate planning in the past. As of February 2006, there were 1,300 Uncontrolled Waste Disposal Sites (UWDS). Their operation has often led to soil, surface and groundwater contamination. In addition, the intentional or spontaneous ignition of MSW in these landfills has resulted in major air pollution, destruction of large tracts of land, and may also affect tourism in the summer months.

Priority should be given to the Region of Attica, because of the continuously increasing MSW generation rates and the acute land scarcity for new landfills.

This study relied on past studies, visits to Attica's waste management facilities sites and interviews of experts in the field, as well as local and central government authorities. Also, a questionnaire was developed and distributed to the 122 Organizations of Local Administrations (OLA) that belong to the Region of Attica. The questionnaire included questions regarding the current actual population; the generation and composition of MSW; the collection and disposal methods; the recycling habits; and the costs of the current Solid Waste Management (SWM) system. Much of the questionnaire was completed by interviews of people responsible for the SWM system of each OLA. Out of the 122 questionnaires that were distributed, 105 municipalities and communities that responded - a success ratio of 86%. The database was completed by estimates of the missing data based on the collected data.

These data were integrated by means of Geographic Information Systems (GIS) technology to provide a reliable description of the assets and liabilities of Attica Region's SWM system and use this information suggesting major improvements.

EXISTENT MSW SITUATION IN ATTICA REGION

The Region of Attica generates 2.8 million tons of MSW annually, i.e. 58% of the national total. Thus, the per capita daily generation of MSW is 1.6 kilograms. This value is much higher than in other parts of Greece, where it ranges between 0.6 and 1.4 kilograms per capita. Figures 1 and 2 show the distribution of population and MSW generation by the OLAs of Attica Region.

Most of the MSW generated in the Region is deposited at one sanitary landfill (Figure 3) that should have ceased operation in February 2006. Furthermore, there are very few locations that satisfy the criteria for creating new sanitary landfills and there is strong opposition against landfills by neighboring communities. The situation is exacerbated by a low rate of recycling. For all these reasons, it is clear that several changes must be made to the current scheme of MSW management so as to maximize its assets and minimize its negative impacts.

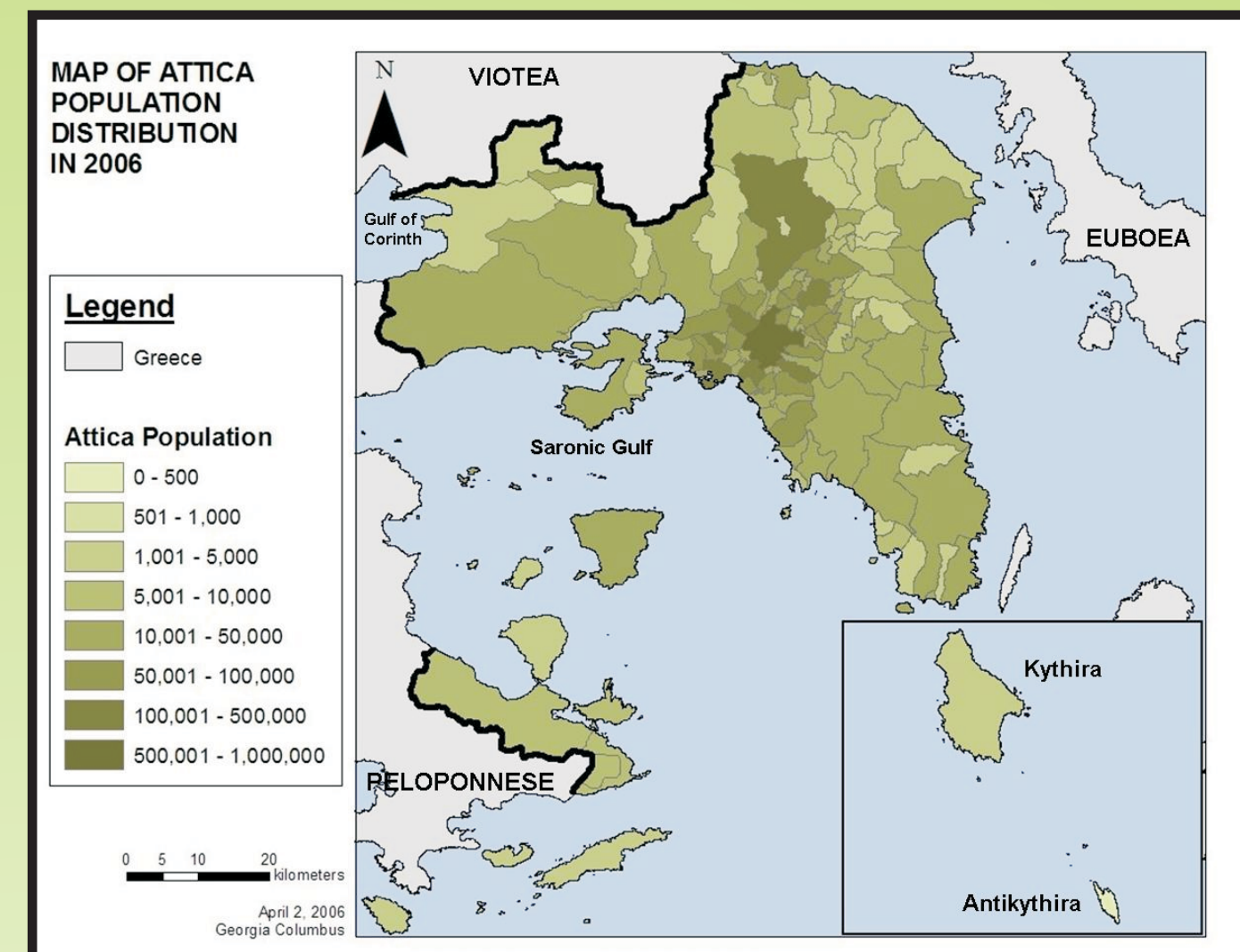


Figure 1

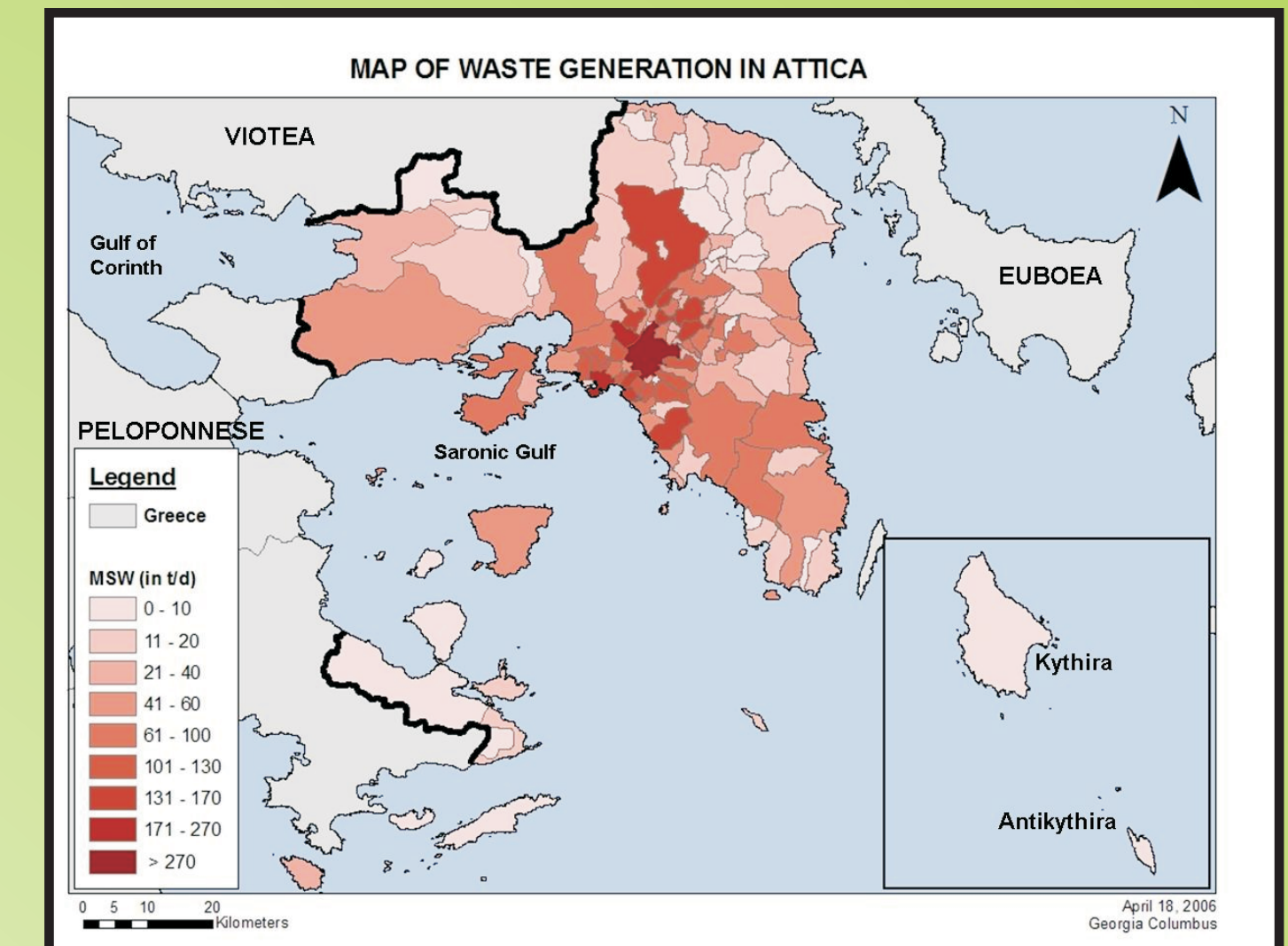


Figure 2

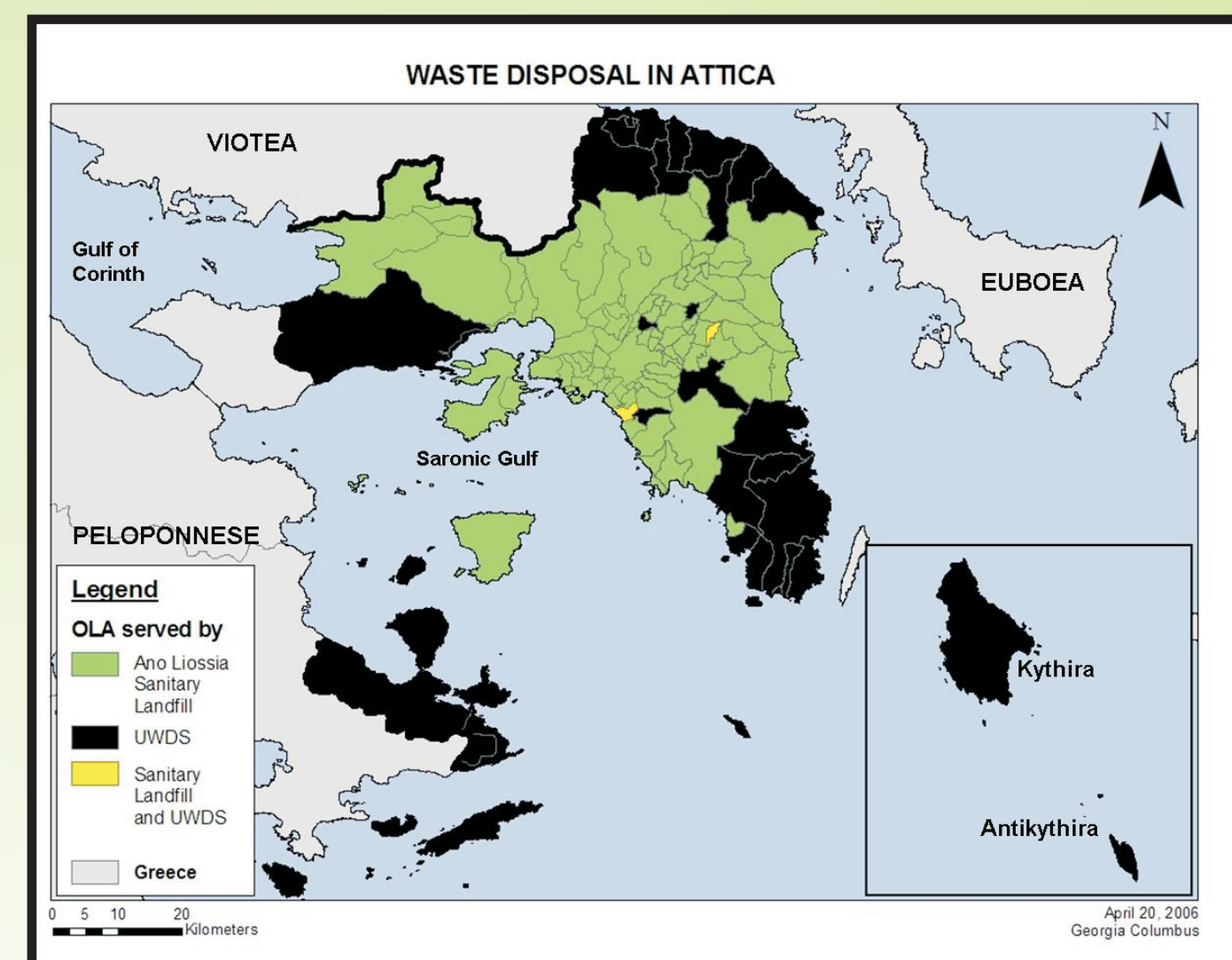


Figure 3

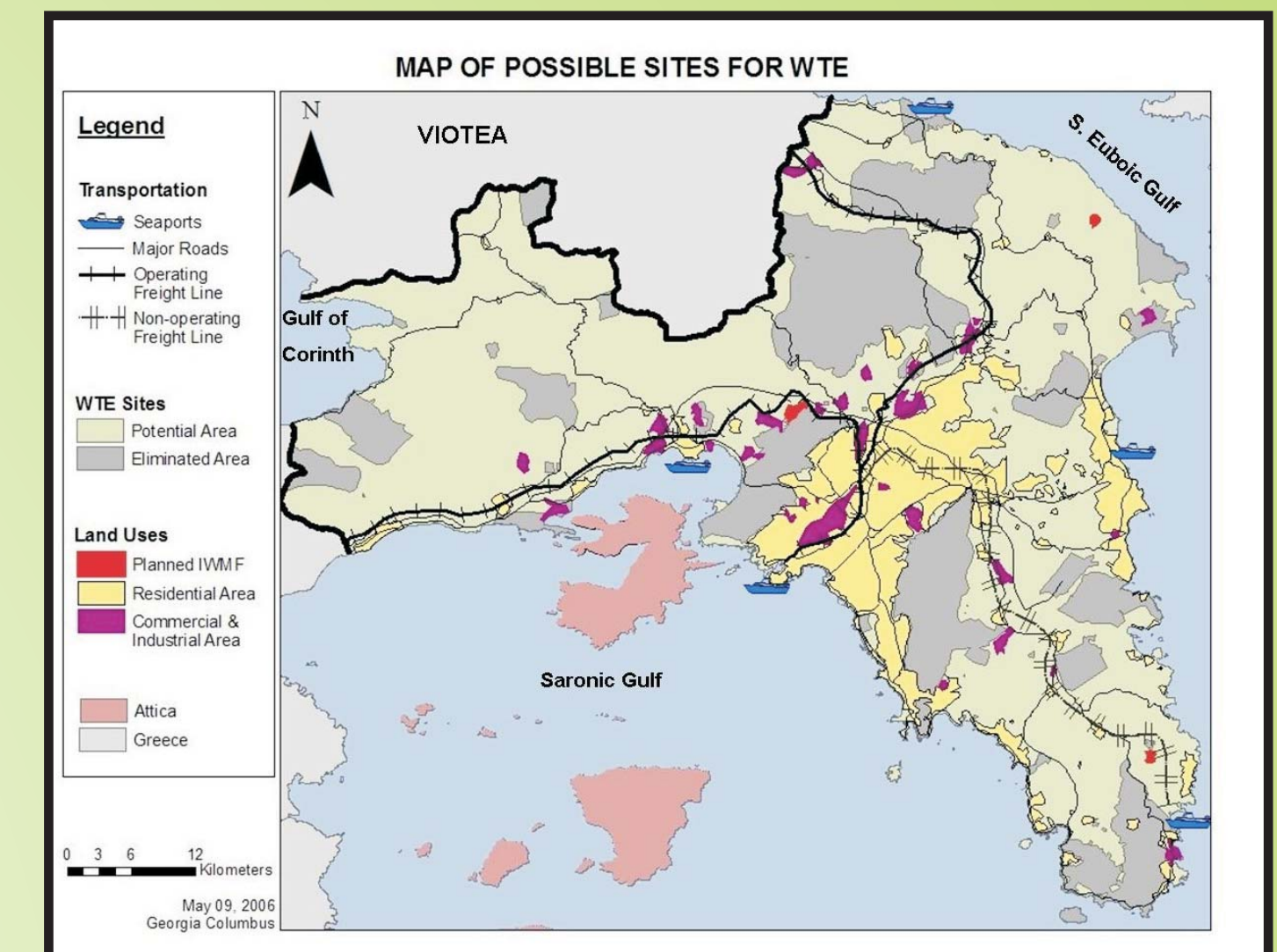


Figure 4

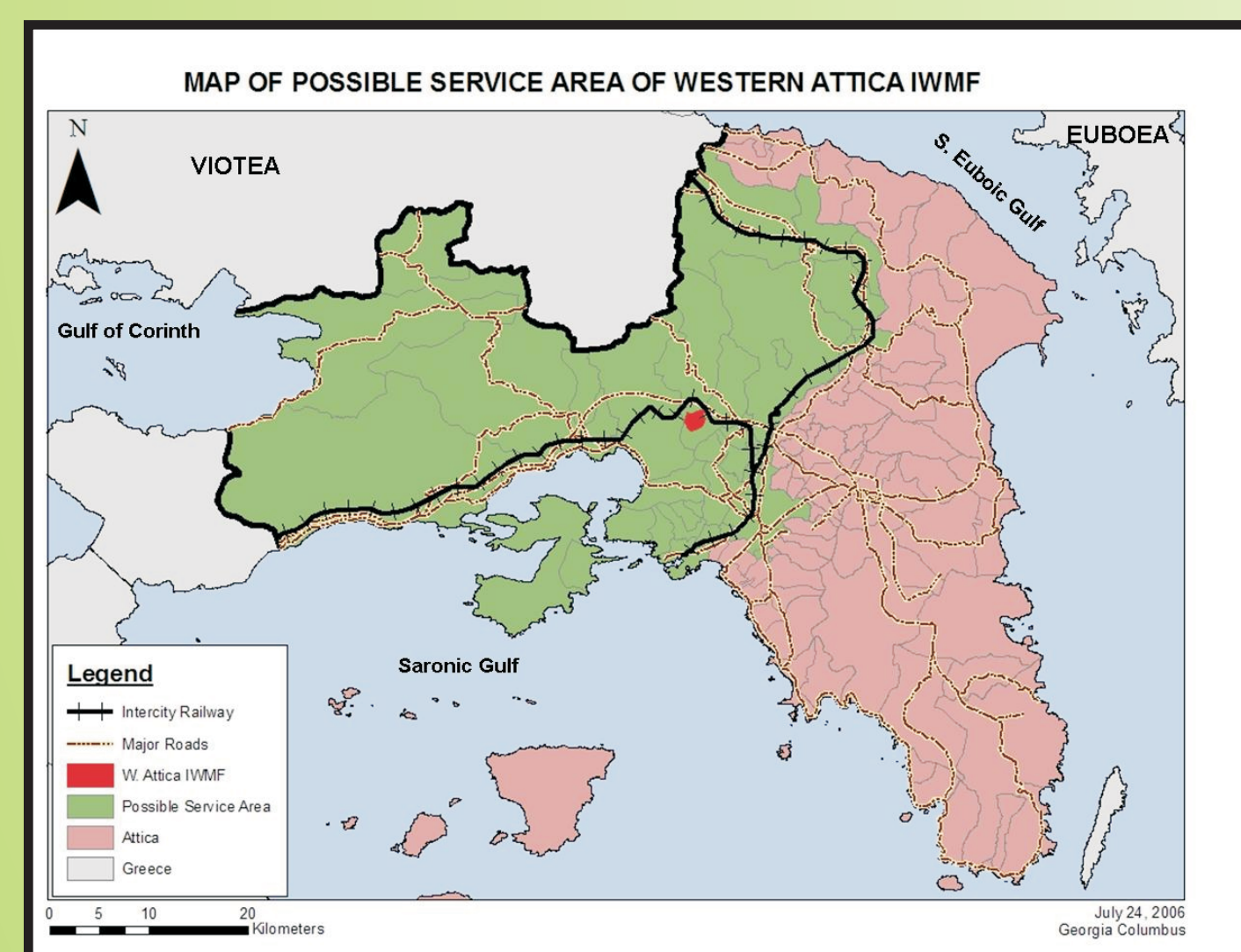


Figure 5

WASTE-TO-ENERGY

A promising long-term technique for MSW treatment prior to disposal is the controlled combustion of MSW with generation of thermal and electrical energy (Waste-to-Energy). WTE facilities generate heat and electricity, save valuable landfill space, and can be used in perpetuity with proper maintenance.

This study comprises a preliminary assessment for WTE as a possible solution of the MSW problem in the Region of Attica. In order to design a new MSW management scheme, the projected capacities of the currently operating facilities and of those proposed by the current Regional Plan for SWM of Attica were used.

THE FIRST WASTE-TO-ENERGY FACILITY IN ATTICA

Figure 4 shows the possible areas for siting WTE facilities in Attica taking into consideration the waste management and transportation infrastructure, as well as the residential, commercial and industrial land uses. The most promising of these is located at the municipality of Phylli.

Hence, a WTE facility of a daily capacity of 3,000 tons of MSW is proposed to be located at the OLA of Phylli. Figure 5 shows a possible service area, while Figure 6 presents the assumed daily material flows in the waste management facilities that will serve this area.

The construction costs of the proposed facility were estimated to reach approximately \$535 million. Approximately, 6,000 megawatt-hours of thermal energy and 2,100 megawatt-hours of electricity will be produced daily. Also, the operation of this single WTE facility will increase the recycling rate by 5-53% and reduce the amount of waste to be landfilled by 43-55% in relation to the projected recycling and landfilling in the proposed Regional Plan for SWM. These values depend on the quantity of bottom ash will be used beneficially. Figure 7 presents the daily material flows in the proposed facility on the conservative projection that only ferrous and non-ferrous metals will be recovered from the bottom ash of the WTE plant.

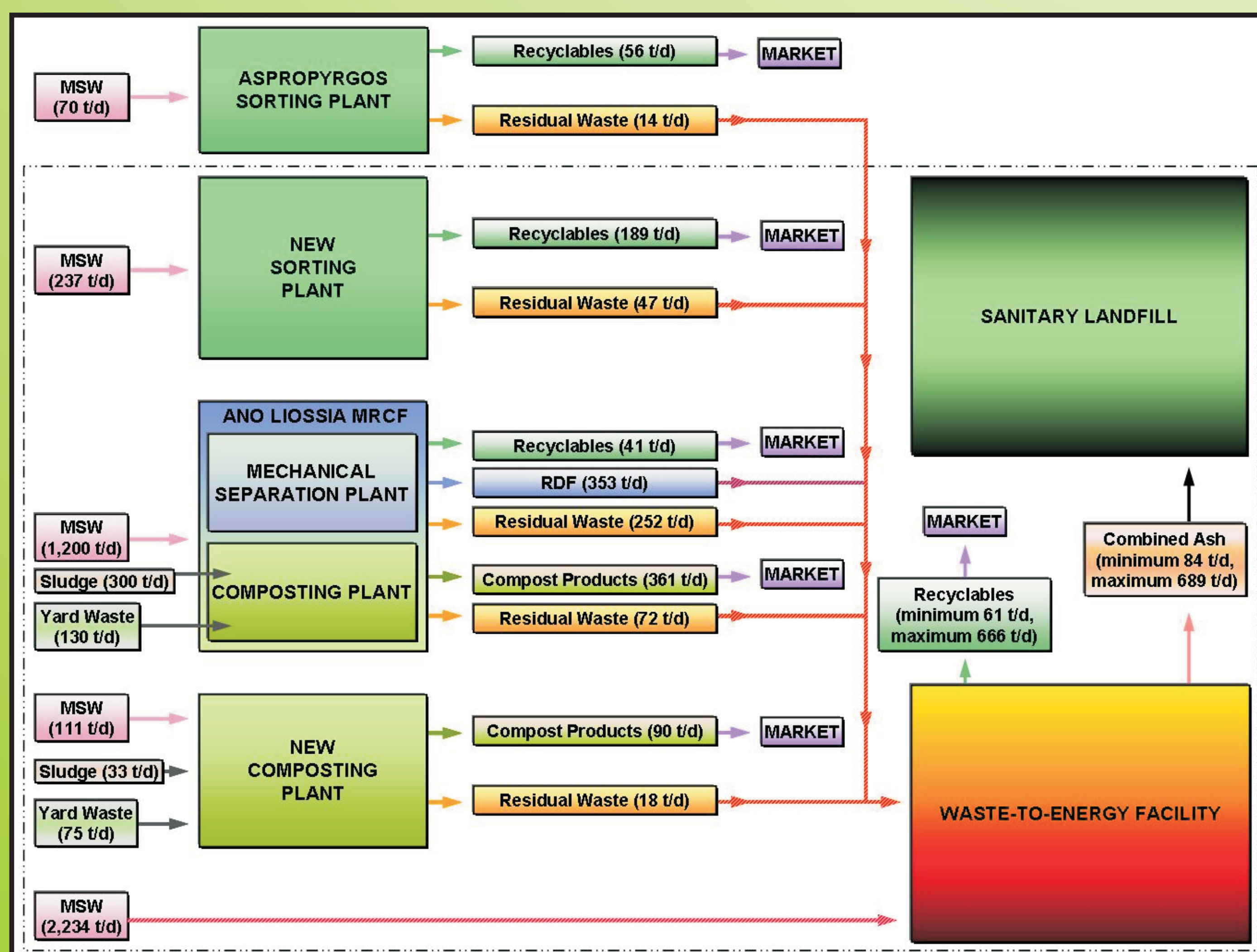


Figure 6

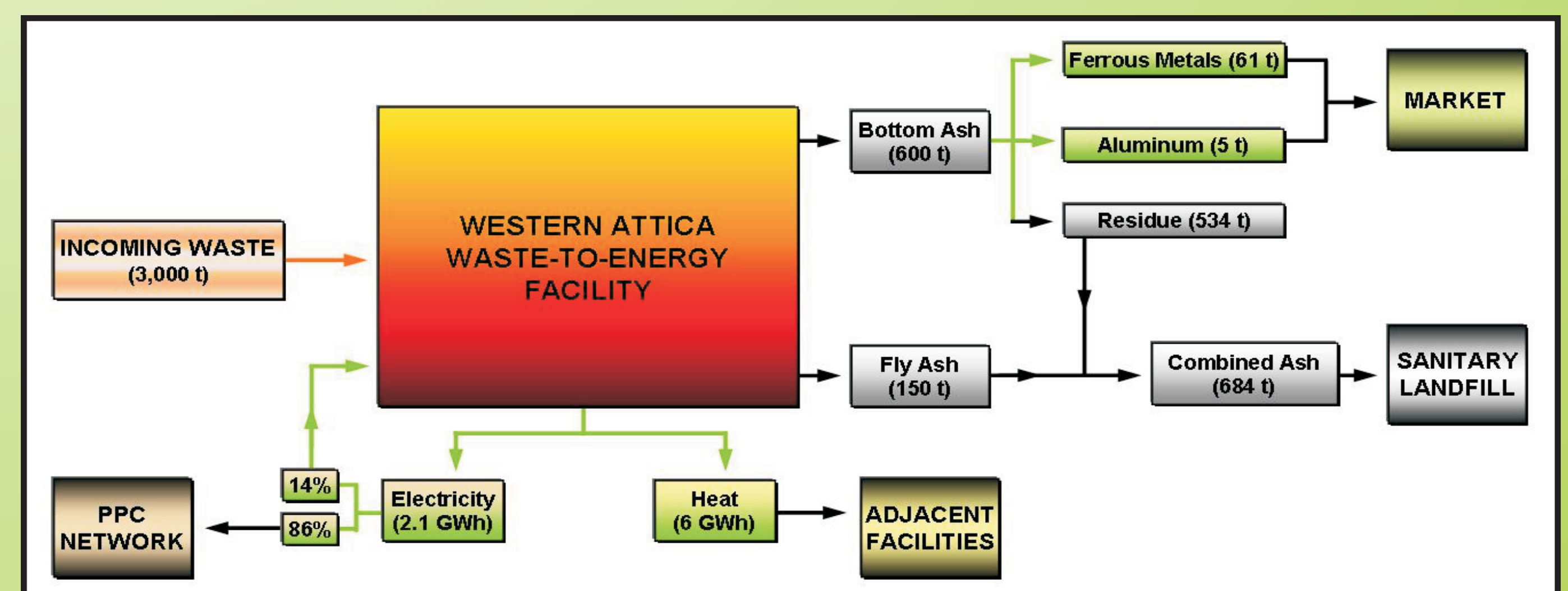


Figure 7

IMPLEMENTATION OF ADDITIONAL WASTE-TO-ENERGY FACILITIES IN ATTICA

The potential of further implementation of WTE in the Region of Attica was examined. Siting two WTE facilities of total daily capacity of 6,000 tons of MSW would result in an increase of the daily material recovery rate by a minimum of 10% (if only ferrous and non-ferrous metals are recovered) or a maximum of 106% (bottom ash is beneficially used) and a reduction of the amount of waste to be landfilled by 79-97% respectively, in relation to the projections in Attica's Regional Plan for SWM. Also, the generated thermal and electrical energy would reach 12,000 megawatt-hours and 4,200 megawatt-hours, respectively. Implementation of this option would require the operation of at least one Marine Transfer Station (MTS).