

## Energy Savings in the Cement Industry – Opportunities in the African Context

توفير الطاقة في صناعة الإسمنت – الفرص ضمن السياق الأفريقي

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يمكن زيادة الربحية طويلة الأمد وتحسين الأداء المالي في صناعة الإسمنت في الأسواق الناشئة والمتطورة على حد سواء وذلك من خلال تنفيذ التقنيات الحديثة والرائدة واستخدام مدخلات الإنتاج الرئيسية مثل المواد الخام والكلنكر والطاقة الحرارية والطاقة الكهربائية. وقد قامت شركة PEG S.A. بتنفيذ عدة مشاريع للمحافظة على الطاقة وزيادة الإنتاج في جميع أنحاء العالم. وتهدف الشركة لضمان الأداء المستدام طويل الأمد في صناعة الإسمنت من خلال الإبداع والتطوير وتعتبر شريكا دائما لصناعة الإسمنت الإفريقية من خلال تقديم خدمات في مجال المواد الخام للوقود البديلة وتوسيع الطاقة الإنتاجية.

### **Introduction**

Throughout the global economic downturn, cement markets in emerging countries, including many on the African continent, have continued to demonstrate strong growth. This growth presents a unique opportunity for the cement industry and cement producers to expand production capacities by utilizing highly efficient and modern technologies as well as the opportunity optimize the major inputs into the manufacturing process, thermal & electrical energy and raw materials, in a long term sustainable manner.

The implementation of efficient and modern technologies is a key contributor to the industries sustainability and financial performance. Operational contributors to the financial success of the cement industry in Africa include sales revenue (expressed volumes and price level) and the reduction of key input costs such as energy, raw materials and semi finished clinker products.

PEG S.A considers energy and raw material substitution as well as clinker substitution as key contributors to the long terms financial performance of the cement industry; with improved environmental performance being an additional benefit.

This article looks at several key areas in which PEG S.A. is active and promoting further development giving examples in an African context.

### **Thermal Energy Savings through fuel substitution**

The significant thermal energy requirements and positive combustion environment within cement facilities, provides the opportunity for the cement industry to utilize large quantities of alternative fuel and raw material sources (AFR); in general these alternative fuels are by-product, or waste streams, from industrial, commercial, agricultural and municipal sources.

The use of AFR as a replacement for traditional fossils fuels is well established in developed countries (with up to 80% replacement of fossil fuels being achieved in some cases). In emerging markets the implementation of alternative fuels provides a unique opportunity for producers to improve both financial and environmental performance of the cement plant.

With the increasing costs of traditional fossil fuels such as coal, fuel oil and gas, the consolidation and use of industrial, commercial, agricultural and municipal by-products as an alternative fuel is becoming increasingly feasible in financial terms, even without the availability of government subsidies, and is a contributing factor to the long term financial performance of the industry in Africa.

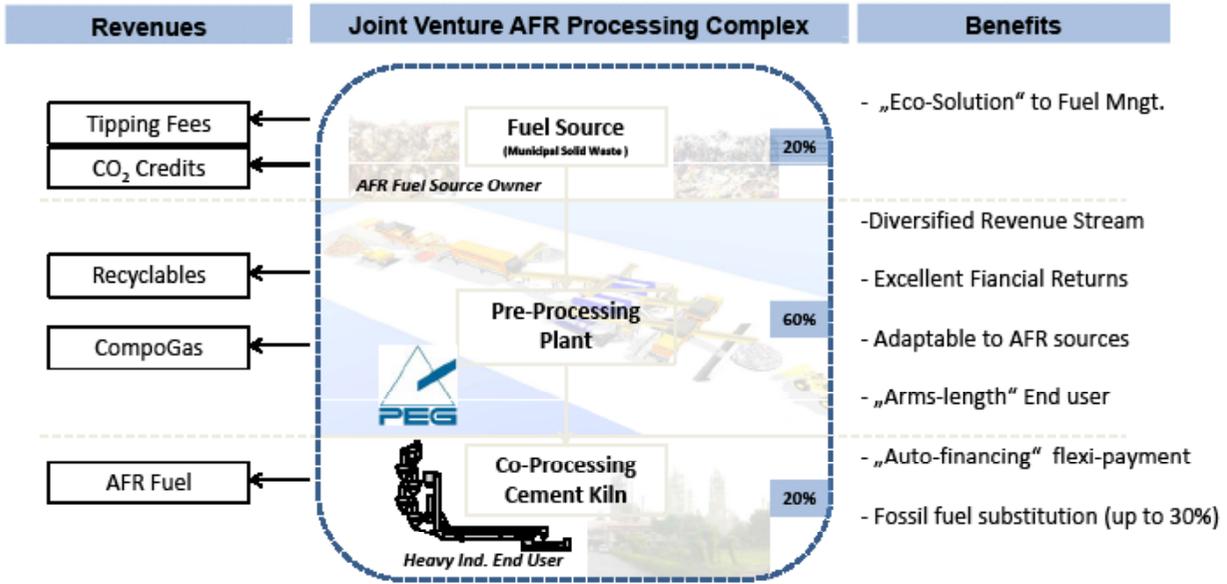


Figure 1 –AFR Processing platform example – municipal waste

PEG S.A., the world leading cement consultancy and experts on the implementation of alternative fuel firing systems, has developed a proven formula covering the entire spectrum of the requirements for collecting the raw waste through to the production of AFR and lastly the ability to coprocess the material inside the cement plant. Working from the establishment of the dumpsite right through to the production and sale of the fluff, as well as the supply and installation of the necessary plant feed systems the current focus for developing markets is on the installation of highly flexible AFR platforms which allow for fast set up times, low investment costs and a high level of mobility which allows for fast changing local conditions, be it commercial, political or social.

The organizational structures for such a project range from proprietary ownership through to joint ventures between PEG SA, sourcing & end use stakeholders.

Revenue is generated through streams such as waste disposal fees, environmental credits, recyclables, methanization and end user fossil fuel substitution provide the financial justification of integrated AFR platforms with very short payback times, typically less than 25- years, being achieved .

**Electrical Energy Savings through waste heat recovery systems**

The release of excess thermal energy is inherent in the cement manufacturing process and heat is predominantly emitted from the main stacks of the cement plant. It is often difficult to totally eradicate waste heat inefficiencies however, the technology required to harness this excess thermal energy and convert it to electrical energy/power is becoming increasingly interesting financially. Through the

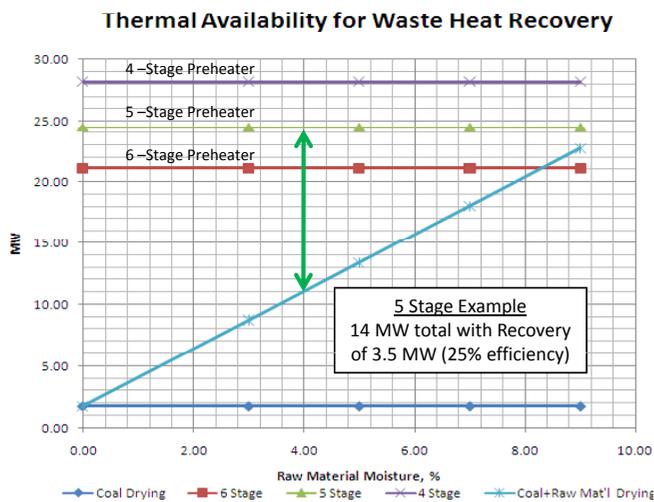


Figure 2 – WHRS –5000 tpd clinker, 4% -raw material, 10%-coal moistures

installation of waste heat recovery systems (WHRS) cement plants can essentially benefit from “free power” once the initial investment has been amortised.

Electrical energy recovery through the installation of a waste heat recovery system reduces the overall “external” power demand, results in a direct reduction of production costs and has a positive financial contribution. Within a typical cement production facility sufficient electrical energy can be recovered to ensure the continuous operation of the core plant production departments (clinker production); a distinct benefit in many regions in Africa where weak supply networks tend to lead to production interruptions. Investment thresholds for WHR systems are typically achieved with at electrical energy costs in excess of 0.05USD/kwh in emerging markets and 0.10 USD/kWh in developed markets. This estimation takes into consideration a 5 year time frame and a cost of capital (WACC) of 10%.

**Electrical energy savings through blended cements**

Composite, or blended, cements which meet internationally recognized quality standards provide a large scale opportunity to cement industry to increase production capacity (with minimal investment) and reduce specific production costs. Both of these outcomes are direct drivers of the financial returns. Composite cements with a clinker substitution of up to 50% through pozzolans, limestone, slag and fly-ash extenders are systematically being introduced in many geographic regions and markets .

With limited access to industrial by-products such as fly ash and slags, emerging markets often resort to the use of naturally occurring materials such as limestone and pozzolans to produce composite cements.

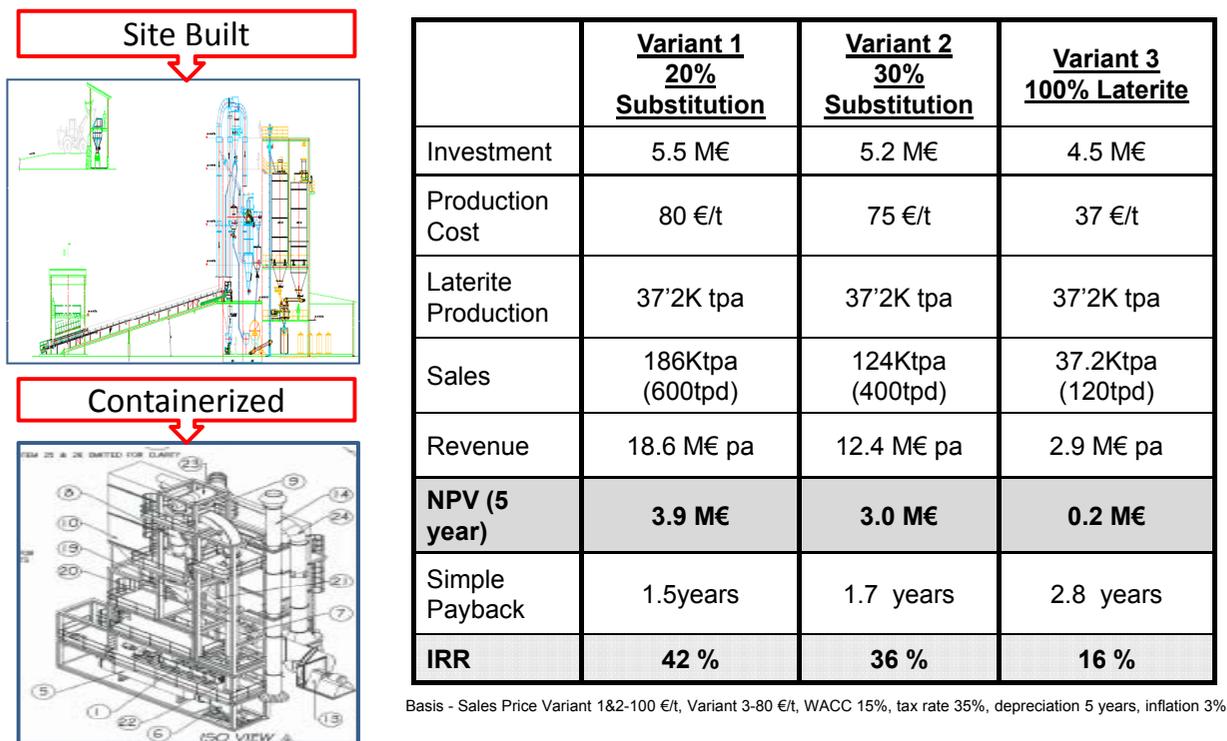


Figure 3 – Decentralized “MiniPlant” - 35190- kt/year Lateritic Composite Cement

PEG SA currently has an active research & development program in order to further the development in the utilization of composite cements. In addition to natural and industrial extenders and corresponding technologies, it is now becoming increasingly possible to make use of alternative sources such as calcined laterite (readily available in Africa). Laterite can be activated through the installation of a “Mini plants”. This, and the alternative material activation, are being actively promoted and implemented by PEG S.A..

**Vertical Integration – the Cement Industrial Complex**

The current focus of many cement industry players on the African continent is on primary manufacturing. On a longer term basis cement producers should aim to optimize their operation through moving up the value chain by integrating primary (Cement production), secondary (Readymix concrete) and tertiary (construction contractor) manufacturing processes. The so called “industrial complex” is being widely promoted by PEG S.A. as a mechanism to ensure sustainable financial performance.

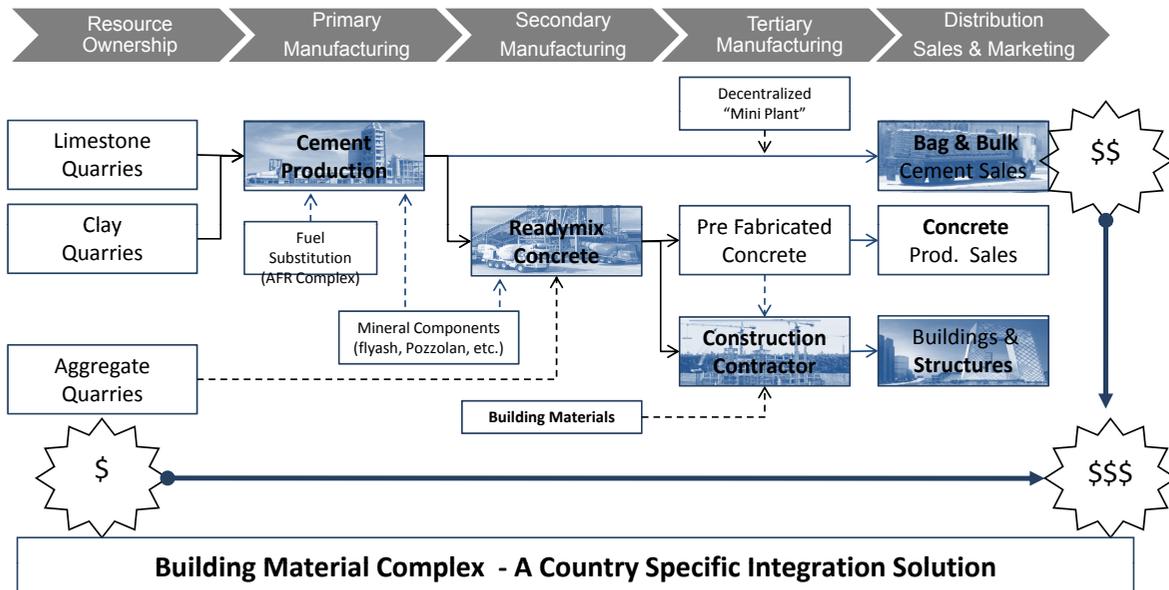


Figure 4 – Cement Industrial Complex – An African emerging market example

Implementation of an “industrial complex” consisting of a fully integrated value chain encompassing primary, secondary and tertiary manufacturing processes as well as material sourcing, AFR and composite cement extenders results in a highly competitive and streamlined organization. Such fully integrated industrial complexes are, at present, being implemented by PEG S.A. on the African continent.

**Conclusion**

Within emerging markets, as in developed markets, long term profitability and improved financial performance of the cement industry can be increased through the implementation of leading edge technologies, integration of the value chain and the substitution key production inputs such as raw materials, clinker and thermal energy and electrical energy .

With over 45 years of international experience in the cement industry PEG S.A. has successfully executed energy conservation and capacity increase projects worldwide.

Innovation and development remain at the forefront of PEG S.A.’s goals to ensure the long term and sustainable performance of the cement industry.

With the objective of sustainable long term profits and financial performance of our clientele, PEG S.A. is a dedicated partner of the African Cement Industry and offers its services for all AFR, production capacity expansion and value chain integration projects.