



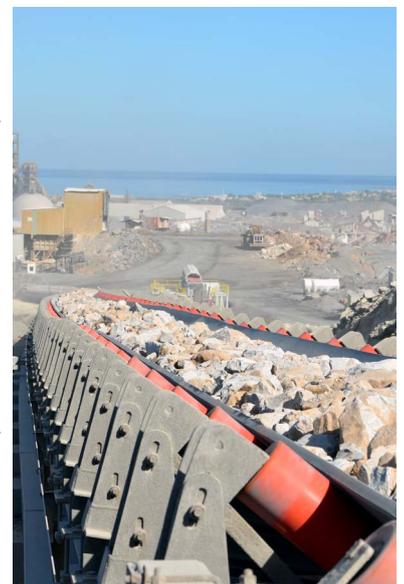
# CONVEYOR SYSTEM WITH POWER GENERATION

QUARRY MINING LLC (QM) design, manufacture and install Crushing & Screening plants in compliance with European standards, while adhering to the same safety standards and features that you would expect of equipment produced in Europe. QM is certified for quality management by ISO Certificate 9001:2008 and for environmental management by ISO Certificate 14001:2004 from the German Technical Inspection Association TÜV Rheinland/Germany, and include the continuous integration of all upgrades. QM is founded and managed by German Nationals but located in the United Arab Emirates. QM can supply high-quality plants with very competitive prices.

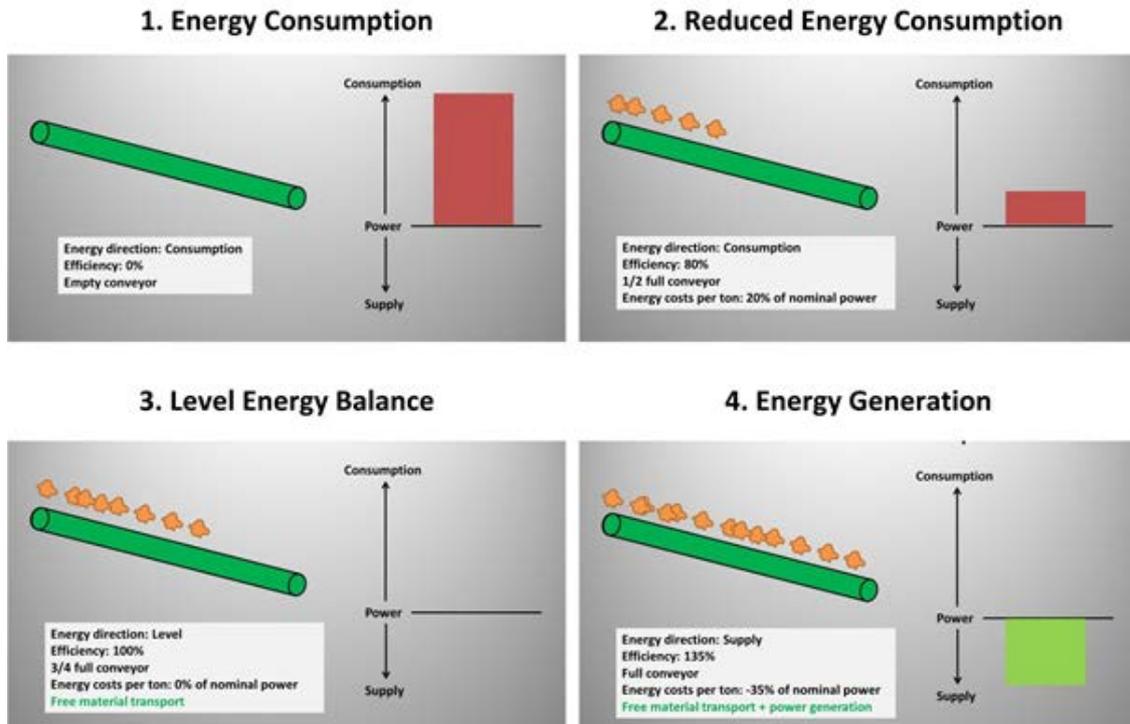
Conveyors have been used for material transport in a wide range of applications in mines and quarries. Key factor for safe and efficient operation of such conveyor systems is sustainable maintenance and high quality parts, especially the rollers, drums and belt, but also drive system and control system. It is obvious that operation companies want to keep the costs for maintenance and energy as low as possible, but on the other hand have the downtime of the plant at a minimum. It is always a balancing act which will affect the final price per ton directly. Quarry Mining LLC (QM), a Germany-Arabian company located in UAE, has developed a solution to source electrical energy out of the material transport, and therefore reducing the energy costs to zero and in addition generate electrical power. Together with the QM own designed and customer tailored conveying system the transportation costs per ton can be reduced dramatically.

## Intelligent conveying solutions

Christian Drewes, Technical Manager of QM: "In 2015 we realized a pioneering project of a 3,5km long conveying system, with a total capacity of 2x 4.000t/h in one of the largest lime stone quarries in the world. It's the first downhill conveying system in the region and with that system our client can reduce the transportation costs per ton to a minimum and saves a lot of energy." One of the special tasks was the partial downhill route of the conveying system. In order to prevent the system from over speed caused by natural gravitation force, the potential energy has to be "pulled out" of the system. Therefore a control system with electronic brake system has been developed by QM. With that system, it is possible to brake the downhill conveyor electrically and wear-free. In addition the potential energy of the material is converted into electrical energy, which is feed back to the grid and can be used for other plants. With that solution a negative energy balance of the conveying system can be realized. This means not only the material transport is completely energy free; in addition electrical energy can be generated from the transportation. In case of power failure a special brake system ensures the safe stop of the complete system. Highest safety standards have been met. Frequency converters are used as drive unit to ensure smooth start and stop of the more than 700m long conveyors.



To generate the electrical power a highly complex PLC system is required to control the conveyor at any time and to keep the belt speed always at the same level with any maximum speed difference of 1%, for any load conditions. Only if these requirements can be met a safe operation of the complete plant can be ensured. The following pictures are showing the different load conditions of the conveyor system and the corresponding energy demand.



As can be seen with full load the energy demand is negative and energy is generated in addition to the material transport. The feedback capacity depends on the height difference between head and tail drum. The bigger the height differences the bigger the energy generation. It is obvious that the power generation is increasing the more material is on the belt, because more material will cause a higher potential energy and will "drive" the belt more. So it is a win-win situation, the more material the more the energy savings. Such system can be realized whenever material needs to be transported downhill.

This solution, engineered, designed, manufactures, installed and commissioned by Quarry Mining LLC is a unique and future-oriented solution provided to the client. It is sustainable, extremely environmentally friendly and reduces the energy costs dramatically.