Smart City – Good Practice

**Energy**

# Akcansa - Waste Heat Recovery Plant

**Canakkale, Turkey**

## Akcansa - Waste Heat Recovery Plant

**Akcansa is a cement company owned by Sabanci Holding and Heidelberg Cement Mediterranean Basin Holdings. It is the largest cement producer in Turkey. The cement industry is responsible for 5% of human based GHG emissions. 50% of these emissions arise from production processes, 40% from fuel consumption, 10% from electricity consumption and transportation [1]. The Akcansa cement plant located in Canakkale constructed a waste heat recovery plant with 15.2 MW capacity which recovers waste heat as electrical energy [2].**

## Country/ City Profile

| Country | | City | |
|---|---|---|---|
| Population (2014) | 78 million [3] | Population (2014) | 511,790 [3] |
| Land area (km²) | 783,562 | Land area (km²) | 9,955 [5] |
| GDP per capita (2014, US$, at purchasing power parity) | 10,830 [4] | GDP per capita (2011, US$, at purchasing power parity) | 8,954 (NUTS II) [5] |
| Region | Europe, Asia | Region | Coastal |

| City's physical geography | | |
|---|---|---|
| | Location | ✓ Located in the north west of Turkey, Marmara region<br>✓ The city extends over two continents; Europe and Asia, divided by the Marmara Sea |
| | Climate | ✓ Cold winters, dry hot summers<br>✓ Windy conditions throughout the whole year<br>✓ Average temperature: 14.7 °C; min: -4.2 °C in February, max: 35.8 °C in August<br>✓ Annual average precipitation: 662.8 $m^3$ - 854.9 $m^3$ |

## Initiating context

The waste heat recovery plant is located in the premises of the Akcansa Canakkale cement factory situated around 50 kilometres south of Canakkale, close to the district of Ezine and the village of Mahmudiye [6]. The waste heat recovery plant produces electricity to be consumed on-site. It is the first heat recovery system in Turkey integrated in a cement factory. The system includes six boilers, one steam turbine, a water-cooling tower and other auxiliary units. Through waste heat recovery about 105 million kWh of electricity are produced annually [6]. Thereby the system is able to provide its own electricity need. The waste heat recovery project is important in terms of coping with climate change, energy efficiency and GHG emission reductions. Also, the waste heat recovery plant has applied for a Gold Standard registration in terms of voluntary emission reductions certificates related to on-site energy consumption and accompanied greenhouse gas reductions [10].The Gold Standard is the most rigorous certification standard globally for carbon offset projects. It ensures that energy efficiency and renewable energy projects actually reduce $CO_2$ emissions and provide benefits to the local population as well as contribute to the conservation of biodiversity and the sustainable use of natural resources [11].

## Project description

The waste heat recovery power plant has a capacity of 15.2 MW. The produced electricity is reused in the industrial processes of the Canakkale cement plant. [7]. The project is designed to provide 30% of the Canakkale cement factories electricity need, which is equal to the annual amount of electricity consumed in the Canakkale city centre. Additionally the project reduces 60,000 tonnes of $CO_2$ emissions and generates about 105 million kWh electricity annually [2].

It has various positive social, economic and environmental benefits for local sustainable development [2]:

- ✓ Being the first example of its kind in Turkey, the project will help to popularize this technique and to increase awareness on energy conservation and energy consumption reduction.
- ✓ The project creates job opportunities for professionals, workers and residents, thus contributing to the local economy.
- ✓ Fossil-fuel based electricity consumption is substituted with the electricity generated from the project.
- ✓ There are significant reductions in GHG emissions.

Prior to the project activity, waste heat from the kiln vented to the atmosphere.. The projects waste heat recovery system however utilizes waste heat originating from the clinker calcination process for power generation. Prior to the project, power consumed in the cement plant was imported from the grid. Now, the electricity supplied by the 15.2 MW waste heat recovery power plant is used for the cement production and substitutes electricity which would be partly supplied by the fossil fuel fired power plants of the Turkish power grid. Thus, the project reduces GHG emissions significantly. 58,328 $tCO_2$ emissions are reduced annually [6].

## Implementation process

The waste heat recovery plant project was completed in October 2011 and started operation shortly after [8]. 24 million USD were invested [9]. During the project implementation, special importance was given to stakeholder participation. Stakeholders such as mayors of surrounding villages, towns and districts, local governors and managers of related branches were involved because of their relevance to the project as being responsible for local policy making and being representatives of local people [2].

Experts from a variety of disciplines cooperated. The Akcansa project team was responsible for engineering, equipment and coordination. Simona provided equipment and engineering [1].

| Projects implementation details | |
|---|---|
| **Process** | The project started operation in October 2011.<br>Special importance was given to stakeholder participation. |
| **Leadership** | Akcansa, Sinoma |
| **Financing** | Akcansa |
| **Involved stakeholders** | Mayors, Local Governors and Managers of Related branches<br>Akcansa and Sinoma project team |

## Results

- ✓ Akcansa has invested 24 million USD. Now the project reduces energy costs by 10 million USD annually.
- ✓ The waste heat recovery plant with a capacity of 15.2 MW generates about 105 million kWh (equal to 30% of the cement facility's energy demand)..
- ✓ The project contributes to local sustainable development with its social, economic and environmental benefits.
- ✓ The project has created new job opportunities for local people.
- ✓ Waste heat recovery decreases GHG emissions about 60,000 $tCO_2$ annually.

## Lessons learned

Akcansa waste heat recovery plant is the first example of its kind in Turkey. Experiences with this example encourage other investors in the sector The project not only supports conservation of natural resources but also increases energy efficiency and contributes to sustainable development on local but also on country level.

For cement industries, energy is seen as important in terms of operation costs and impacts of production activities on the environment. As this example shows, using a waste heat recovery system can reduce both, costs and detrimental effects on the environment.

## References


[1] Turkiye Surdurulebilir Kalkinma Raporu: Gelecegi Sahiplenmek, Surdurulebilir Kalkinma En Iyi Uygulama Ornekleri (2012): http://www.temizuretim.gov.tr/Files/uygulamaornek/rio20_iyi%20uygulama%20örnekleri.pdf

[2] Gold Standard Local Stakeholder Consultation Report: http://www.akcansa.com.tr/surdurulebilirlik/canakkale-fabrikasi-atik-isi-paydas-bilgilendirme

[3] TUIK (2014): http://www.tuik.gov.tr/UstMenu.do?metod=temelist

[4] World Bank (2014): GDP per capita: http://data.worldbank.org/country/turkey/turkish

[5] TUIK Secilmis Gostergelerle Canakkale (2013): http://www.tuik.gov.tr/ilGostergeleri/iller/CANAKKALE.pdf

[6] Gold Standard Passport: http://www.akcansa.com.tr/surdurulebilirlik/canakkale-fabrikasi-atik-isi-paydas-bilgilendirme

[7] Proje tasarim dokumanı Turkce ozeti: http://www.akcansa.com.tr/surdurulebilirlik/canakkale-fabrikasi-atik-isi-paydas-bilgilendirme

[8] ITO, Uluslararasi Ticaret ve Surdurulebilirlik (2012): http://www.ito.org.tr/itoyayin/0027670.pdf

[9] Elektrik Ureticileri Dernegi: http://www.eud.org.tr/TR/Genel/BelgeGoster.aspx?F6E10F8892433CFFAAF6AA849816B2EF93B4E8437B69D60E

[10] CDP 2012 Investor CDP 2012 Information Request. http://www.akcansa.com.tr/docs/2012cdp.pdf#

[11] WWF. The Gold Standard. http://wwf.panda.org/what_we_do/how_we_work/businesses/climate/offsetting/gold_standard/


## Author/Contact


**© Istanbul Technical University**

Mimarlik Fakultesi

Taskisla/Beyoglu/Istanbul

http://www.itu.edu.tr/