Increased resource use, decreasing resource availability, globalised markets and evidence of climate change cause a shift in values. Subsequently industry accepts sustainability as an important factor of the company philosophy. In the coil coating industry sustainability is a driving force for new development. Coil coating material and the producing process are considered as sustainable products and processes. This is a great opportunity for ECCA, said Simon Nurse from Capital Coated Steel at the ECCA Autumn Congress to assess our approach to existing and new pre-coated metal markets. Because it is still relatively early days in the development of approaches to sustainability, we can define sustainability in our terms, focussing on managing and improving processes that are known to have significant environmental impact and link high ideals to manageable objectives.

Sustainability Report

In order to evade impacts deriving from economic, environmental and social developments, it is also vital not only to consider the company’s own operations, but to include the operations in the whole supply chain of the products, said Johan Widheden from Akzo Nobel. He presented some ideas about Eco-efficiency Assessment, a tool which has been implemented in procedures of investments, product development and marketing, but also in cooperation with customers.

To fortify the ideas of sustainability ECCA released their second Sustainability Report. This report, which was presented by Graeme Peacock, the technical director of ECCA, is based on the first sustainability report of 2008 and the annual environmental benchmarking exercise which includes 80% of the European coil coating industry. Major results of this report are:

- Electricity usage reduced by 5% and gas usage reduced by 4% since the previous year
- Point source VOC emissions on average reduced by 20%  
- Average water usage reduced by 22%  
- The total carbon footprint of the coil coating process has been measured at 0.53 kg(CO2)/m² of finished product which represents an improvement of 7% over 2009 figures  
- Serious accident rate reduced by over 40%

Safety Management

This report about key environmental indicators is matched by safety data. According to Eurostat, up to 85% of accidents in industry can be traced back to human factors. Therefore safety related research projects have been carried out. One of the largest European Project on industrial safety financed by the European Commission is the “Virthualis” project. This project focused on the development of an IT solution to help improving safety by means of virtual reality and human factors techniques, explained Simone Colombo, who represented Virthualis Company. It ended up with a pre-competitive product, enabling to better perform the so-called four safety actions: Training, Risk Assessment, Operational Safety Management and Accident Investigation. The Virthualis solution will allow moving from “static paper-based simulations” to “virtual dynamic simulations” where actions are experimented in real-time environments. Two industrial applications have been developed and installed in the oil industry.

There are a lot of different instruments for safety management, said Michael Bischoff, BASF Coatings GmbH, like technical, organisational and personal measures. Next to process safety risk assessment, work instructions and training, work permits, incident investigation and contractor management are important. Safety is also the driving factor for the REACH regulation. Eric Brasseur, ArcelorMittal Flat Carbon Europe, gave a short review how the coil coating industry is concerned. New duties are applying to the operators. Substances that are of particular concern for their negative impact on the human health or the environment are being identified for future banning, or restrictions on their use are being introduced. REACH is also imposing new communication duties between the coil coater, its suppliers and customers. The revised Safety Data Sheet is at the heart of this process. Information regarding the substances contained in articles must also be available through the whole supply chain, down to the distributors and individual consumers.
lower energy consumption, lower CO₂ emissions, reduced peak energy demands and a lower urban heat island effect. Cool roofs do not absorb, but reflect, solar radiation. While standard roofs reflect 12 % of the solar radiation, cool roofs have about 29 % solar reflectance which results in air conditioning savings between 10 and 40 %.

40 % of the energy a building consumes is necessary for heating and cooling. The effect of a cool roof is generated by the coating. It reflects radiation especially in the near infrared range, which results in 5 to 10 degree lower surface temperature - depending on the color of the roof - than a conventional roof, said Harald Svedung from SSAB. The heat flux into the building is much lower and there is lower energy necessary for cooling. SSAB is developing coil coated steel sheet materials with adapted heat optical properties for the purpose of reducing exterior surface temperatures and total heat flux in buildings.

Additional advantages with respect to cool roof coil coating material are the lightweight, said Dr. Evan Evans, Bluescope Steel. Coil coating material weighs 5 to 5.6 kg/m² in comparison to 49 kg/m² for terracotta tiles or 44 kg/m² for concrete roof tiles. And the material is more effective because Bluescope Steel was able to reduce the steel thickness for cool roofing from 0.55 to 0.42 mm (-24%) and the steel for framing from 1.20-1.60 mm to 0.60-0.75 mm. Because the cool roof technology is not well known in Europe, the European Union supports a project called “Cool Roofs” that has the objective of promoting cool roofs technology in the EU. Dr. Afroditi SYNNEFA from the Kapodistrian University of Athens presented some results of the project at the ECCA conference. The work is developed with the focus on technical, market, policy and end-users. Some of the achievements include a cool roof products database, 5 case studies, a handbook and a toolkit for estimating savings from cool roofs, a policy landscape assessment and a market promotion plan.

Sustainable Raw Materials

With respect to sustainability, the raw materials for coil coating should also be environmentally friendly and harmless to health. Under REACH legislation, lead chromate pigments, due to their carcinogenic potential, will have to be substituted in the next three years. They are very popular because they make possible excellent red, orange...
and yellow colors. Some organic and inorganic pigments already exist as substitutes, Eckart Korona from BASF SE reported, but they are much more expensive. However there are no pigments which give brilliant orange colors. Alternatives could be layer-systems, a colored primer or to dispense with these special colors. Perhaps another alternative for the future is the development of hybrid pigments.

Organic resins which are the basis of coil coatings today are based on crude oil. At the ECCA conference Chris Lowe, Manager at Beckers in Great Britain, discussed the question whether these raw materials can be substituted by bio-based materials generated from waste or vegetable oil. Today some resins are already produced from soya bean oil or cellulose. But to use them in coatings they have to be extensively tested, whether they can fulfill all demands. Their use in coil coatings will be possible as early as in 2015 and they will be more expensive, according to Lowe.

New Quality Tests

There are no new developments without testing. Astrid Bjørgum from SINTEF Materials and Chemistry reported about an alternative to the existing acidified salt spray (ASS) test used by aluminium coil coaters. The aim of her work has been to develop a simpler test using a standard programmable cyclic salt spray cabinet to predict outdoor corrosion behaviour of coil coated aluminium.

The new cyclic test includes a period with high humidity, a period with alternating acidified salt spray and a drying period. The test conditions appeared to replicate the extent and morphology of corrosion obtained by outdoor exposure. A series of coil coated materials with known corrosion performance was examined to further validate the test.

While corrosion is tested offline, coating thickness is also measured on-line. Udo Bucher from Bronx International & Wolf Innovation introduced a new on-line real-time coating thickness measurement to measure film build at the coater and dry film thickness after curing.

According to Bucher the system is reliable, simple to use, and largely calibration free. It allows the elimination of test strips prior to a production run or the fine tuning of dry film build to very tight tolerances as soon as the cured strip reaches the dry film monitor. The system is based on a laser system. An ablation laser burns a short line of holes through the paint and the hole profile is measured by another laser sensor further down the line. (AJA)