

# Energy Conservation

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## Structural Sustainability

Thomas Rau is an architect in Amsterdam and a campaigner for new forms of sustainable resource management. With Audi Board Member for Production Frank Dreves, he discusses intelligent building, cars as rolling stocks of raw materials and the path to using instead of owning.





## WWF Netherlands

**CO<sub>2</sub>-neutral** – in 2006, Rau converted the Dutch headquarters of the World Wildlife Fund (WWF) into a CO<sub>2</sub>-neutral building. It even has nesting areas for birds and sleeping facilities for bats.



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## CHPC plant

**For optimum energy efficiency** – in Ingolstadt, Audi uses a Combined Heat Power and Cold plant. It achieves excellent efficiency of 78 percent. Together with district heating, it makes an important contribution to a CO<sub>2</sub>-neutral site.

\_\_\_\_\_ *Herr Rau, Herr Dreves, when it comes to ecological issues, politics and society are riddled with action for the sake of action in line with the trend of the day. You, on the other hand, have to take decisions that have very long-term consequences. Does the topic of the day have any role to play in the struggle for more sustainability?*

**Frank Dreves:** Politics, of course, have a role to play in defining the framework in which we operate; and current changes within society are also reflected in the demands made by our customers. However, as a company, we cannot allow ourselves to wait for these developments. Instead, we have to act in advance – because the comparatively long product and investment cycles in our industry demand it. At Audi, we have a long-term strategy to improve on an ongoing basis not only the sustainability of our products, but also of our production. By way of example, since 1999 we have been using highly efficient Combined Heat Power and Cold (CHPC). Since 2004, the Ingolstadt factory has been supplied with excess heat from a waste incineration plant in the city of Ingolstadt. Our heat regeneration facilities in production save energy and reduce carbon dioxide emissions. With the CHPC alone, we have already reduced the CO<sub>2</sub> emissions of the Ingolstadt plant by 17,200 tonnes per year. In the long term, we want to multiply this figure. The same applies to water consumption – the plant is systematically set up for the use of waste water that is recycled in an ecological closed-loop circuit and used multiple times. These things don't come into being because of external demand, but because we feel a sense of responsibility. It is completely independent of the politics of the day.

**Thomas Rau:** Politics often has little to do with actual necessity and more with whichever social lobby is the strongest at any given point in time. In my actions, on the other hand, I am guided by what I believe to be my job. For me, that means pushing forward system innovation. Take, for example, the term "passive house". I don't even like the sound of it – who wants to be passive? I don't want to approach the energy issue from the savings side, but instead create an active house that even generates energy. We have built a school in the Netherlands that generates more energy than it uses – the excess goes into the sports hall and a neighboring

residential area. Even the students' body heat is used for this holistic concept. The question for me is – What are the values that we have to address in a new way? The economy is often a good deal farther ahead in that respect than politics.

**Dreves:** My objective is to make our factory sites completely CO<sub>2</sub>-neutral. In Ingolstadt, we have already taken a whole series of steps in this direction, and we will follow them systematically at our other locations, too. However, this can only be achieved in a symbiosis of economy and ecology, because the money that we invest in achieving our objective also has to be earned. Saving water costs money initially, but if you use the right technology, the investment pays for itself within a relatively short period of time. It is therefore completely feasible to unite short-term benefits with long-term objectives.

**Rau:** The human being has short-term and long-term needs. We must fulfill them in a manner that is not at the expense of others. And this calls for new approaches.

*And what might they be?*

**Rau:** The needs cycle of a customer is often completely different from the lifecycle of a product. Nowadays, customer needs sometimes change faster than the lifecycle of a purchased device. Almost all of us have an old computer or stereo standing around in the cellar or attic that proves this point. Therefore, the customer should purchase a specific function or service and not the device itself. He or she would buy, for example, "ten years of music" or "30 years of floor coverings". This would create a whole new incentive for change. That is also what I mean by system innovation.

**Dreves:** A building is a kind of generational contract. If you build a parking garage with more than 8,000 spaces, you don't tear it down tomorrow. It carries into the next generation. Before we talk about the future, we have to take a look at today. Even the construction of a single family home is fraught with many questions – especially when it comes to sustainability. What building materials do you want to use? What form of insulation? What is recyclable? You can imagine that these questions are far more complex when it comes to the construction of an office block or a production hall. In this situation, I have to make a lot of decisions and carefully weigh up one solution against another. Because if you are striving for CO<sub>2</sub>-neutrality as the main objective, the very first steps you take have to be the right ones.

At Audi, we have a long-term strategy to improve on an ongoing basis not only the sustainability of our products, but also of our production – not because of external demand, but because we feel a sense of responsibility.

\_\_\_\_\_ **Frank Dreves**

**Rau:** A private builder/owner often has no idea what questions have to be asked. And when he asks them, he receives the wrong answer. In our office we say – built space is a service. I talk with my clients about the service quality he wants. How I then translate that into technology and construction is then a matter for the experts. If you give me a job, you simply have to define to me the parameters – I want a house of a certain size, I want a positive energy balance, I want an optimum interior climate, I want only building materials that have been proven not to be harmful to health, and so on. As the customer, you don't have to think in terms of solutions, materials or products. Instead, you have to articulate the "performance" that you desire. Just like a car customer who says: I want a fancy car for four people that has a range of 400 kilometers and an energy consumption equivalent to three liters of gasoline per 100 kilometers. Whether that works best with a combustion engine, a hybrid or an electric motor is then a matter for the engineers. Architectural demands should really be couched in these terms.

**Dreves:** And how many architects of this kind are there?

**Rau:** Not very many. But architects, too, must realize that they can't build any old monument at the customer's cost. Architecture is a spatial service, a service for people. I have to create places for people in which they can realize themselves. And then buildings will also be far less expensive. Our buildings today are much too expensive because we build things that we simply no longer need. The Romans, for instance, cooled all public buildings – and without the use of electric air conditioning. Nowadays you can cool offices by intelligently laying the water lines used for toilet flushing – actually a very simple solution.

**Dreves:** I agree. In order to achieve something good it isn't always necessary to have big ideas – often it's the small steps that achieve a great deal. In our works halls, for example, we no longer use epoxy resin floors, but simply colored screed. That may sound dull at first, but it avoids a waste issue at a later date.

*Does that also benefit the people who work here?*

**Dreves:** In everything I do, I always try to put people at the center point. They are priority number one at Audi – and our most important resource. And when we manage to simplify a procedure through a new process or a new tool, then it is always also good for the quality of the product – and that is how we are measured. In the paint shop, the employees used to be stuck in protective suits to shield them from the paint particles. Today, we can control the airflow – and thus the paint application – so precisely that they are no longer necessary. Production is more efficient, cleaner and the working environment of the individual more pleasant. And the improvements that are made at the suggestion of the employees are usually also the most sustainable. For me, it is therefore important that my coworkers "learn to see"; that they themselves discover what they can improve. When they then notice that their ideas have been taken on board, it is highly motivating.

**Rau:** We are spiritual beings. And certain communication only takes place when people get together. That's how inspiration occurs. That doesn't happen on Facebook. Before we start work on a construction, I invite all of the workers to a presentation. I tell them how the design of this building was originated and what it is they will actually be working on. This gives them a very different and motivating connection to their work. People need to identify with what they are doing. And you have to build this connection.

*Let's stay with people for now. They want to be proud of something, and proud of what they own.*

*Herr Rau, you want to move away from ownership and toward the usage of products.*

**Rau:** In my opinion, the question of ownership is key. I believe that we identify ourselves far too much by the things that we own – the car, the house or the latest-generation cell phone. Two years ago, I decided to clear my office of as much ownership as possible. I invited a lighting manufacturer over and said to him: "I would like to have light. I'll buy a certain quality of light from you for 365 days a year." And it works.

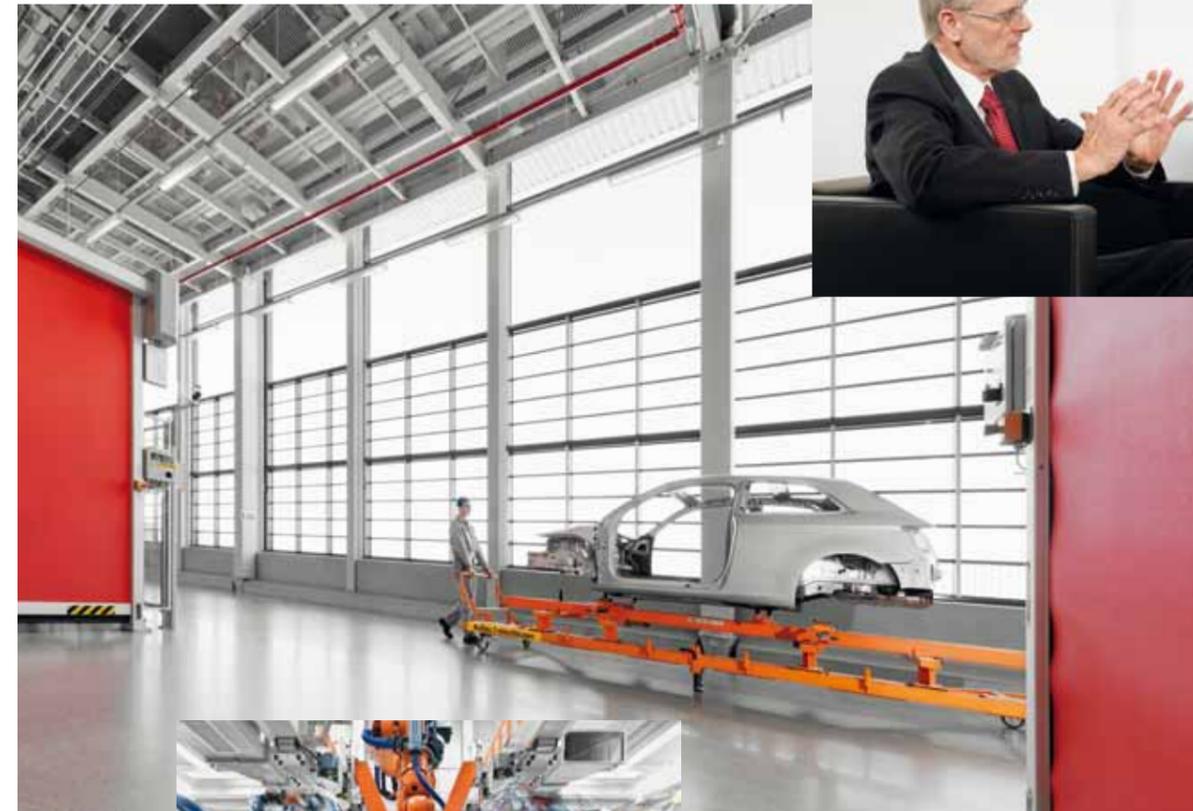
*Audi shouldn't sell cars anymore?*

**Rau:** In my concept, the car and therefore all the raw materials for the entire lifecycle remain in the possession of the manufacturer, as a rolling store of raw materials. You could say that the raw materials are temporarily configured in the form of a car. And sometime in the future, these raw materials can then be reused to create something else. This is somewhat different from partial recycling.



## Christiaan Huygens College

**CO<sub>2</sub>-positive** – the Christiaan Huygens College in Eindhoven is the first CO<sub>2</sub>-neutral and energy-producing school in the Netherlands. The classrooms, for instance, are warmed by body heat. Unused excess energy goes to a nearby residential area.



## Audi A3 bodyshell manufacturing

**For the new Audi A3** – Audi built a completely new production hall with the latest in energy efficiency, as a contributor to a CO<sub>2</sub>-neutral site.

For me, being sustainable means dealing with resources in such a way as not to lose them. Everyone that comes to this earth should be able to benefit from them, in future, too

**Thomas Rau**

## Natuurcafé La Porte

**Innovative revolving door** – when they enter via the revolving door, guests at a café in the Netherlands are generating some of the energy required to make their coffee through a kind of dynamo technology.



## Rotating air-to-air heat exchanger

**Effective heat recovery** – in the Ingolstadt paint shop alone, rotating air-to-air heat exchangers avoid the emission of more than 23,000 tonnes of CO<sub>2</sub> per year.



If you systematically examine and improve every single step, then it is no longer necessary to talk up sustainability. At Audi, we have been thinking and acting this way for a very long time.

\_\_\_\_\_ **Frank Dreves**

## Thomas Rau oneplanetarchitecture

“I can’t build anything else than sustainably. Our bodies are amazingly regulated. They can regulate themselves with very simple means. Why shouldn’t that work for a building?” This is the principle adhered to by Thomas Rau. He has been the owner of the RAU architectural office in Amsterdam since 1992. He would like to design his buildings to extract their energy from their surroundings, thus making them CO<sub>2</sub>-neutral. Rau also sees people as a factor that can not only consume energy, but also generate it.

Rau lives and works in the knowledge that every action has an effect – ecological, economical and social. And this is why, with every project, the architect takes into consideration the history of the site, the needs of the occupier and the local surroundings.

Whether a building is public or private, Rau is far from reaching the end of the road in his search for intelligent alternatives for saving energy. For him, one thing is clear, “why build CO<sub>2</sub>-neutral, when you can also build CO<sub>2</sub>-positive?”

As a consequence, it would mean that Audi would no longer sell cars, but rather mobility. That car is only made available to the customer for a defined period of time to provide a defined service. And because the company itself has to bear the consequences of a good or a bad design itself, cars will probably look different. And that is how we get innovation. We have to take the step from consumption to usage.

**Dreves:** Nevertheless, we can’t forget about the personal pleasure of ownership. The car has a powerful emotional dimension for people. In that way, it is very different from a television or a washing machine. We will certainly continue to sell our cars. However, that doesn’t preclude us from thinking in parallel in very different directions. There will surely be changes in usage behavior – how fast and to what extent this kind of rethinking will take place will only become evident over time.

*Are there already any examples of such concepts.*

**Dreves:** We are currently using a number of different projects to test what our customers really expect from such concepts and, first and foremost, what they actually need. Of course, we are also doing this under the premise of economic feasibility. One example is the Audi urban concept, a compact electric car for city traffic. We are currently discussing the idea of a low-volume run with an innovative leasing model.

*Sustainability has become a buzzword that can be interpreted in all sorts of ways. What does sustainability mean to you, personally?*

**Rau:** For me, sustainability has to do with mindset, not with solutions. All the resources of this world are common property that has been made available to humanity. And the question is – How do we deal with that? For me, being sustainable means dealing with these things in such a way as not to lose them. Everyone that comes to this earth should be able to benefit from them, in future, too. So far, we have been economizing the ecology. Instead, we have to ecologize the economy.

**Dreves:** And for me, that mindset has to do with conservation. I was brought up not to waste things, but to feel a sense of responsibility for them. If we take responsibility actively and on a long-term basis, it means acting in the interests of a good quality of life for future generations of employees and customers. At Audi, we implement this responsibility in the way we deal with our employees, in our products and, above all, in their production, too. And our responsibility doesn’t stop as soon as our cars roll off the lot. We look at the entire process chain – through to recycling our cars. If you systematically examine and improve every single step, then it is no longer necessary to talk up sustainability. At Audi, we have been thinking and acting this way for a very long time, without talking about it very much. That, too, is ‘learning to see’.