



GREEN FROM THE START – VOLKSWAGEN’S COMMITMENT TO SUSTAINABLE FUTURE IN CHATTANOOGA



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WHY CHATTANOOGA?

Green actions attract green companies

For nearly 40 years, Chattanoogaans have been building a national reputation for addressing pollution and embracing sustainable growth practices. That attitude has proven a fertile incubator for green businesses and a point of attraction for outside investment by environmentally conscious companies – Volkswagen as a global player, but also many national and local companies.

FROM LAST PLACE TO A LEADING POSITION

Chattanooga first galvanized to address environmental issues in 1969 when the federal government designated Chattanooga as the city with “the dirtiest air in the United States.” Many Chattanoogaans learned of this dubious distinction from an evening news report by Walter Cronkite. They responded rapidly by establishing a public private partnership to develop solutions.

Local elected officials and industrial leaders banded together with medical professionals. They created the Chattanooga Hamilton County Air Pollution Control Bureau, and manufacturers voluntarily spent \$10 million implementing emissions controls. Within five years, Chattanooga met or exceeded all air quality standards and became one of the first eastern cities to win federal attainment status.

Cleaning up the city’s air quality was a defining community experience that inspired a lasting environmental focus among Chattanoogaans. In the 1980s, sustainable growth was a primary theme as citizens

developed the public vision that resulted in Chattanooga's nationally acclaimed revitalization effort.

As the revitalization plan unfolded over the next two decades, Chattanoogaans made environmentally conscious choices at every opportunity.

They established green spaces throughout the community and developed a master plan to create a continuous greenway system that would preserve natural spaces while providing recreation and alternative transportation links through the community. To date, the community has established 25 miles of walking paths including the 11-mile Tennessee Riverwalk.

In building the Tennessee Aquarium, the largest freshwater aquarium in the world, Chattanoogaans ensured that environmental conservation was part of the mission of the scientists and experts employed there. As they addressed the need for downtown mass transit, Chattanoogaans launched a free electric bus service. In transforming the city's downtown waterfront, Chattanoogaans realized a shared public vision that included green spaces on both side of the river, a wetlands preservation area, and pedestrian connections.

In 2006, with the support of the local community and its leaders, Chattanooga Mayor Ron Littlefield signed the U.S. Conference of Mayors Climate Protection Agreement. Participating cities must lower their carbon emissions and lessen their individual impact on global climate change. The Mayor's Green Committee developed a Climate

Action Plan designed to benefit the environment, economy, health and wellness of the community. Today, the Mayor's Office of Sustainability will continue this vision and work to improving the community's already strong environmental stewardship.

VOLKSWAGEN: RE-USING INDUSTRIAL AREAS

Enterprise South was previously a Volunteer Army Ammunition Plant. In the early 1990s, Hamilton County and the City of Chattanooga formed a partnership to purchase the site and develop it with the goal of creating 21st Century jobs. At the same time, the county and city set aside half of the 6,000 acre area as a permanent nature preserve.

After a complete remediation of the site, local leaders worked with the State of Tennessee, the Chattanooga Chamber and dozens of other organizations to develop and market the site.

In 2008, Volkswagen announced its decision to locate its new home of U.S. manufacturing operations at the site.

According to Hamilton County Mayor Claude Ramsey, Volkswagen is realizing the community's vision: developing the area to create environmentally friendly jobs. "Our community has a long-standing focus on sustainable development," Ramsey said. "Volkswagen is exactly the kind of environmentally conscious company we wanted to attract. The partnership between Volkswagen and the Chattanooga area is producing sustainable economic growth – now, that's a story worth telling."

GREEN COMPANIES

Chattanooga's continuing focus on sustainability has already resulted in green development projects in both the public and private sector.

At the same time, the community has recruited or grown companies with a strong focus on sustainability. Taken together, a green approach to development and business are the continuation of a story that started in Chattanooga nearly four decades ago.

Aerisyn LLC was founded in 2004 and began operating the first automated wind tower production facility in North America in Chattanooga.

AquaShield, Inc. manufactures a unique line of patented Storm Water Treatment Solutions to effectively treat highly contaminated storm water runoff and protect environmentally sensitive receiving waters.

Big Frog Mountain supplies alternative and renewable energy equipment worldwide and has installed many remote and utility grid interactive solar electric power systems since 1989.

Signal Wind Energy, LLC is a general contractor providing Balance of Plant (BOP) services to the wind energy industry.

Tandus established the Infinity Initiative, the first and only full-scale closed loop reclamation and recycling system for floor coverings.

Tricycle, Inc. helps eliminate waste in carpet design, manufacturing and marketing through their patented SIM virtual manufacturing

system. The company has earned international and sustainable leadership including a National Design Award for Corporate Achievement nomination this year.

TVIG provides an integrated power generation infrastructure platform that combines state-of-the-art renewable energy technologies, conventional thermal power generation and utility revenue management solutions.

GREEN BUILDINGS

Chattanoogaans are building on a tradition of sustainable development through a new initiative called Greenspaces, which aims to support the development of 20 LEED Certified buildings in downtown Chattanooga by 2011. Existing environmentally conscious developments include:

BlueCross BlueShield of Tennessee – The company’s recently completed \$299 million headquarters campus is one of the largest projects to seek LEED certification in the Southeast.

Chattanooga Convention Center – Named a Top 10 ecofriendly convention center by Successful Meetings magazine. The Chattanooga Convention Center is designed to take advantage of natural light and features individual temperature controls for each exhibit space.

Development Resource Center – Urban planning, permitting, and infrastructure functions for both Chattanooga and Hamilton County are cooperatively housed at the Development Resource Center which pioneered a number of sustainable building practices.

EPB (Electric Power Board) – As Chattanooga area electric power distributor, EPB sets high environmental standards with its new headquarters facility, which was built on a brownfield site and includes sustainable features ranging from the use of recycled materials to an extremely energy efficient design and climate controls. EPB is also the energy provider chosen for the Volkswagen plant in Chattanooga.

One North Shore – Tennessee's first LEED Certified shopping center.

GREEN INNOVATIONS FROM AN INNOVATIVE COMPANY

Energy saving begins with electric motors

Modern manufacturing demands increasingly higher levels of automation, and that requires electricity. In fact, up to half of all plant-related energy costs result from electric motors. To conserve energy and reduce costs, Volkswagen uses only the most efficient electric motors available. For the Chattanooga facility, that will translate into an annual savings of about 3 million kilowatt hours – enough to supply the electricity needs of 750 households for an entire year.

A bright idea: Efficient continuous-line lighting

Thanks to modern lighting technology, using less energy doesn't mean flipping off the light switch or working in the dark. T5 light bulbs arranged in a continuous line system can be adjusted to different lighting needs. In the office, T5 lights save electricity and also help to reduce monitor glare. This efficient lighting system saves 20 percent energy compared to conventional industrial lighting. In fact, with the mirror reflectors, these lights gain up to 90 percent greater efficiency.

Whether in workshops or offices, motion detectors provide additional savings. Lights are automatically shut off in unused areas.

Compared to conventional systems, T5 light bulbs and motion detectors will save about 1.15 million kilowatt hours annually. That's enough to supply the electricity needs of nearly 280 households.

Smart solution for street lights

Outside lighting is a critical component of plant safety. But, safety doesn't have to come at the expense of efficiency. At Volkswagen, high pressure sodium vapor lights with mirror technology provide the same degree of illumination as conventional lighting, but with half the energy consumption. These lights are so powerful and efficient that they can be positioned more than 180 feet apart and still provide adequate visibility.

This system saves about 100,000 kilowatt hours, which would supply the electricity needs of 25 households.

Even the Volkswagen-Badge saves energy

When there is so much effort taken to save energy throughout the new Volkswagen plant in Chattanooga, the luminous twelve-foot badge of the brand should be part of it. LED-Technology makes it possible: Instead of conventional fluorescent tubes consuming more than 2,000 watts, Volkswagen uses a large set of LEDs (light-emitting diodes) that needs only 150 watts. Same brightness, 90 percent less power, and a lifetime of 50,000 hours. In comparison to conventional system, there will be annual savings of about 4,600 kilowatt hours – enough to supply one household for all their electricity needs.

Optimizing the efficiency of laser welding

At Volkswagen, quality is everything. To achieve high quality standards in the vehicle body welding process, Volkswagen uses advanced laser technology. Just how important is laser welding? The new mid-size sedan being built in Chattanooga has 344 inches of laser-welded seams plus another 60 inches of laser brazing lines. Thanks to a new technology called the diode disc laser that is seven times more efficient than conventional lasers, Volkswagen is saving 222,000 kilowatt hours of electricity annually.

A closer look on air compression

Apart from due consideration of energy consumption costs during the planning and procurement stages, checks of energy consumption after the commissioning of the plant or system are as essential as the development of a company specific energy management scheme. Further measures are the use of energy-saving power units and plant machinery, intermittent operation of ventilation systems, the installation of measuring instruments as well as the comprehensive avoidance of compressed air. Volkswagen has switched to a maximum of six bar instead of former 12 bar.

Fresh idea for fresh air

It's no secret that air conditioners consume enormous amounts of energy. For large buildings such as automotive production plants,

keeping cool comes at a price. Volkswagen's solution is a smart ventilation system that continually compares the temperature inside the plant to the temperature outside. As soon as the outside temperature drops below the inside temperature – usually at night – the night cooling feature is automatically activated: Cool, fresh air is pumped inside the plant until the desired temperature is reached.

By comparing Chattanooga's climate to other Volkswagen plants worldwide, the company calculates that the chillers can be switched off an average of three hours every day. The energy saved is equal to supplying 75 households.

Fresh air when and where you need it: introducing coat ventilation

With coat ventilation, Volkswagen is revolutionizing how air circulates throughout the plant. Coat ventilation outlets can be positioned anywhere on the production floor and through a built-in air deflector bring fresh air – cooled or heated – where it's needed most.

The air deflector not only ensures good air quality, it also reduces the energy bill. Annually, these systems save Volkswagen two megawatt hours of electricity compared to conventional systems. That savings is equivalent to the consumption of 500 households.

Heat recuperation by air-to-air heat exchangers

The air-to-air heat exchanger stores the temperature of warm exhaust air and passes it on to incoming air. This simple process reduces the need of heating up or cooling down fresh air from outside the plant when great differences in temperature apply. The amount of thermal energy that is saved would be sufficient to temperate 250 households.

The Economizer

Volkswagen also reuses exhaust gasses to warm water. A system called the Economizer warms the water with the exhaust pipe's heat, increasing efficiency by about five percent. The annual savings of natural gas is the same as could be used by 50 households.

Reducing nitrogen oxide in gas burners

Natural gas burners are efficient and have lower carbon dioxide (CO₂) emissions than many other heating devices. For Volkswagen, that is not enough. Just as the clean diesel cars with lowest nitrogen oxide emissions, we make sure the gas burners we use are low NO_x-burners. It's important, since nitrous gases in air layers near the ground effect high ozone concentrations, in middle air layers they produce acid rain in combination with soot, dust and sunlight and in high air layers nitrogen oxide destroys the ozone layer.

Emission reduction even in the Paint Shop

The complex paint process of today's automobiles ensures long lasting coatings. By introducing a new basecoat that replaces a previous step, applying the primer, also one drying process is redundant. Same great quality, but about 20 percent less CO₂-emissions from dryers in the paint shop.

Saving stormwater

At the Chattanooga facility, even stormwater is recycled. Volkswagen collects and filters stormwater and directs it into a cooling pond, saving almost 290,000 gallons of fresh water. It's also used in the plant's restrooms to flush toilets, with another 158,000 gallons saved. By comparison, the average household uses about 16,000 gallons of fresh water every year.

Preventive groundwater and soil protection

Some production processes require special materials, which, if improperly handled, can turn into environmental risks, thus also constituting a risk potential to the company. Substances and waste products harmful to water can cause underground pollution and damage as well as future financial risks. All measures necessary to prevent a possible contamination of the soil and the groundwater have to be taken in order to exclude any risks to the environment and the

company caused by water-pollution. In order to ensure the best possible prevention of potential environmental hazards, all new plants and systems have to be equipped with comprehensive safety measures. The establishment and maintenance of industrial plant cadastral inventories ensures the complete inclusion of all relevant sites and risk potentials and helps towards an optimization of the plants.

Seperate sewer systems

The mixing of different waste water flows (storm water, production and domestic) results in high costs for waste water purification. Leakages in the sewer system can cause costly contaminations of the groundwater and also in the ground. In addition, the ingress of extraneous water can result in additional costs for waste water treatment. The first step for best prevention of ground and groundwater contaminations is the identification and elimination of leakages in the sewer system. Additional cost savings are possible through the separate discharge of undiluted waste water and its special treatment (e.g. the partial flow treatment for production waste water). Separate sewer systems are specified for all newly planned production buildings such as the Chattanooga plant. Sewer conditions are monitored at regular intervals.

Environmentally friendly roofing

Thermoplastic Polyolefins (TPO) weather-resistance and its resilience over time make it an ideal roofing solution. Add to that, TPO is bitumen-

and polystyrol-compliant, making it environmentally friendly. Volkswagen will place a TPO roof on its Chattanooga plant.

Preserving energy through smart insulation

As any homeowner knows, insulation is critical to energy savings. At Volkswagen, our plant's sandwich panel shell provides the ultimate solution. The six-inch mineral rock wool panel makes the building airtight and helps to maintain temperature. The panel elements are so tightly constructed there is no risk of thermal bridges or condensation. With no VOC's or CFC's, and 40 year lifetime and 100 percent recyclability, this material is also extremely friendly to the environment.

Sustainable waste management

Sustainable waste management includes the reduction of risk potential associated with waste, installing manufacturing processes low in waste and harmful substances, and the optimal separation of waste. An additional requirement is the optimization of logistics through the use of safe and sustainable disposal routes. Even at the planning stage of production technologies, it must be the goal to work towards processes that are low in waste and also in harmful materials. A well-working waste management and materials flow management system must be aimed for in order to separate waste as effectively as possible, thus ensuring that the cost of disposal does not increase and also that the highest possible added value as high as possible can be achieved as the

result of the recycling. Regular monitoring and controls of the disposal plants are essential, and the transparency of company waste flows should be guaranteed at any time e.g. by using barcode or transponder systems.

Involve our business partners

As a result of the increasing percentage of outside manufacturing the importance of environmental and social welfare requirements is ever increasing. The identification with external partners plays a significant part in the appraisal by customers, investors, rating agencies and the general public. The target must be the integration of suppliers and service providers into the Volkswagen Group's environmental management systems and the implementation of the Group's social charter by these same partners. One of the essential requirements is the detailed information of the business partners about these company-specific sustainability requirements. In the long-term, these requirements are to be implemented through the introduction of environmental management systems by all partner enterprises. These measures will be supplemented by local expert advice as well as by an intensive exchange of experience with the business partners. In addition, these company sites receive the best possible support for the early detection of potential risks as well as for performing supplier qualifications.

DIESEL? CLEAN DIESEL!

Jetta Clean Diesel: A thrifty green bestseller

The Jetta is a prime example of the art of German engineering. No other car developed in Europe can claim similar success in the United States. In parallel to its gasoline versions, since August 2008 the Jetta TDI was the first clean diesel available in all 50 states. It is one of the most fuel efficient and cleanest engines in the country. This successful model is available as a sedan or wagon; the latter is called the "SportWagen." Today, 30 percent of all Jetta and 50 percent of the Jetta SportWagen are ordered as a clean diesel by U.S. customers.

The Jetta's new four-cylinder turbo-diesel is so fuel efficient (41 mpg highway) and so clean, that the Jetta TDI and Jetta SportWagen TDI are eligible for a \$1,300 tax credit. From the very first day they are driven, cars like these Volkswagens make a contribution toward drastically reducing emissions and fuel costs. In fact, compared to similarly powered gasoline engine, the Jetta TDIs have up to 35 percent better fuel economy. Additionally, the technical design on the clean diesel reduces particulates and nitrogen oxides (NO_x) through internal engine modifications and the use of a NO_x storage catalytic converter. With this technology the Jetta reaches up to 90 percent lower NO_x emissions and fulfills the BIN5 emissions standard. That helps the environment. Immediately.

WHAT MAKES THE VOLKSWAGEN TDI A CLEAN DIESEL

If you ask a Volkswagen engineer, the answer is simple: "Exhaust gas recirculation reduces nitrogen oxides." For the everyday consumer,

that might take a bit more explanation. The fuel economy of a diesel comes from the high combustion chamber temperatures. But this also increases the generation of nitrogen oxides. Volkswagen engineering has limited these gases through optimized combustion chamber geometries and precise injection processes at extremely high pressures.

But, limiting combustion temperatures and the concentration of oxygen is necessary to reduce emissions even further. External exhaust gas recirculation in the combustion chamber helps achieve these goals. The gas is taken from the exhaust system and is cooled on the way to the combustion chamber. These actions reduce temperature-dependent nitrogen oxide emissions by up to 60 percent.

To eliminate the remainder of the NO_x gases in the catalytic converter, the engine switches to an operating mode with richer combustion. The process takes only a few seconds and is imperceptible to the driver. The NO_x storage catalytic converter is most efficient with extremely low sulfur diesel fuel (sulfur content less than 15 parts per million). In the United States, large scale introduction of this diesel type began in October 2006.

WHY DIESEL IS THE RIGHT SOLUTION

The Jetta TDI is economical and agile and fun to drive. It accelerates to 60 mph in just 8.5 seconds, has an average highway fuel economy of 41 mpg and provides 236 ft-lbs of torque at a low 1,750 rpm. And the word is out.

Dr. Jens Hadler, Director of Volkswagen Engine Development says:
“High fuel prices and a significantly increased environmental awareness have led more and more U.S. car drivers to favor diesel every day. Therefore, many car drivers – especially in California – have been looking forward to a clean diesel such as our TDI. I think this engine will help the diesel make a breakthrough in America, because it consumes very little fuel and can cover enormous distances on one full tank. And in a country as large as the U.S., that is an immeasurable advantage.”

DIESEL? CLEAN DIESEL!

Touareg Clean Diesel: the thrifty green SUV

In spring of 2009, Volkswagen introduced the new Touareg Clean Diesel to the American market. A Touareg has never been more fuel efficient and more environmentally friendly. That's why the vehicle is eligible for a \$1,150 tax credit in the United States. The 165 kW / 225 hp (at 4,000 rpm) strong Touareg V6 TDI fulfills the strictest emissions standards in the world, including the BIN5 of the states of California, Massachusetts, New York, Vermont and Maine. So just like the Jetta TDI already, the new Touareg V6 TDI is offered in all 50 states.

MUCH POWER, LESS FUEL

The high-tech engine of the all-wheel drive Touareg is making its debut with a fuel economy of 25 mpg on the highway. The Touareg V6 TDI defines a completely new generation of extremely fuel efficient and low-emission SUVs. One of its technical trademarks: the SCR catalytic converter, which reduces NO_x emissions by up to 90 percent. This Touareg V6 TDI is one of the first SUVs in the world to have this type of catalytic converter, and also integrated into the emissions system are an oxidation catalytic converter and a particulate filter.

The fact is that economical turbo-diesels with direct injection like the V6 TDI are making a bigger contribution toward reducing fuel consumption and greenhouse gases.

In parallel, the V6 TDI satisfies even the highest expectations when it comes to dynamic response and comfort. The turbo-charged V6 TDI is

as quiet as a gasoline engine, yet it is far more powerful. It develops a torque of 406 ft-lbs starting at a low 1,750 rpm. So it is no wonder that despite its fuel economy, the Touareg V6 TDI – shifted by a six-speed automatic – accelerates from 0 to 60 mph in just 8.5 seconds.

One of the most technologically advanced engines is behind this combination of power, dynamic response, fuel economy and low emissions. The car is built around a 3.0 liter displacement V6 turbo-diesel with exceptionally efficient third generation common rail injection. This type of injection and a special noise damping package ensure that the V6 TDI will impress as a whisper-quiet diesel.

POWERTRAIN AND EMISSIONS CONTROL IN DETAIL:

The new Touareg V6 TDI is a combination of the SCR catalytic converter, an oxidation catalytic converter and a particulate filter. First, exhaust gases flow through the oxidation catalytic converter, then the particulate filter and finally the SCR catalytic converter. The acronym SCR stands for “Selective Catalytic Reduction.” The converter is selective because it has the special task of converting the NO_x components into nitrogen and water.

The nitrogen oxides are converted in the SCR catalytic converter using a synthetically produced aqueous solution of urea (AdBlue). To protect against freezing, the tank is heated in the winter (starting below 13 degrees Fahrenheit). AdBlue consists of 32.5 percent urea and is continually sprayed into the exhaust gas stream upstream of the

SCR catalytic converter. The engine management system ensures the precise flow of Adblue based on information from a NO_x sensor downstream of the SCR. Finely atomized by a screen, the urea is transformed in the hot exhaust gases upstream of the catalytic converter. In the SCR catalytic converter, it reacts with the nitrogen oxides and splits them into nitrogen and water.

INTERNAL ENGINE MODIFICATIONS

Beyond the SCR catalytic converter, Volkswagen engineers have developed innovative modifications that increase fuel efficiency and are environmentally friendly.

For the first time, combustion chamber sensors are monitoring pressure conditions in the cylinders. And, a new third generation common rail system with 2,000 bar injection pressure atomizes the fuel so that it is exceptionally fine. The targeted ideal combustion enhances quiet running and reduces emissions. Another technical highlight are the two integrated intercoolers for the turbocharger. When the engine is cold, an automatic bypass door isolates the coolers from the system. This ensures that the V6 TDI reaches its ideal operating temperature quickly, allowing it to attain optimal efficiency.

COMBUSTION CHAMBER SENSORS AND COMMON RAIL INJECTION

As engineers began to develop the V6 TDI, their first goal was to optimize all aspects of combustion. The result is a world's first in high-volume

clean diesel engine production: the combustion chamber sensor. Integrated in the glow pencil, the sensor continually measures pressure conditions in the cylinder and reports the data to the engine management system. This enables perfect control of injection and combustion for each cylinder and it can also compensate for fluctuating fuel qualities. Ideal combustion helps to reduce emissions and optimizes quiet running and noise behavior.

The advanced common rail injection system serves the same purpose. The new high pressure pump design (CP 4.2), allows the system to reach higher pressures than ever before. The piezo injectors also have been significantly modified. Their smaller eight-hole nozzles inject fuel into the combustion chambers in miniscule volumes. This new design and its higher pressure make injections even more precise and dynamic.

In total these innovations have made the V6 TDI one of the most fuel efficient and cleanest six-cylinder diesel engines in the world.

MORE MILES PER GALLON ON THE NEW GTI

TSI for the legendary fuel efficient sportscar

The sixth generation of the legendary GTI is a perfect example how sportscars can be highly efficient. With an anticipated EPA-value of 33 miles per gallon highway driving, the benchmark of all “hot hatches” is more fun to drive and efficient than ever before. Its powerful 155 kW/210 hp turbo engine, delivers audible dynamics with a sound generator and new exhaust system design (two tailpipes, one left and one right). The GTI successfully transfers the tradition of the original version to the future and is becoming an international phenomenon.

FEATURING TSI-TECHNOLOGY, THE TDI-COUNTERPART

As the gasoline counterpart of Volkswagen TDI technology, the TSI-engine is the highly efficient driving force of the GTI. It is a highly agile, turbocharged direct injection motor that has two liter displacement and a 9.6:1 compression ratio. The resulting package delivers enormous propulsive force allowing the car to accelerate from 0 to 62 mph in just 6.9 seconds. For the new GTI an optional 6-speed dual clutch transmission (DSG®) is offered as an alternative to the 6-speed manual transmission.

SAVING FUEL IS ALSO A MATTER OF SMART SHIFTING

DSG® – the different automatic transmission by Volkswagen
for more miles per Gallon

The dual-clutch gearbox's mechanical power transmission makes it as efficient as manual gearboxes. The DSG® also automates gear selection without the slightest jolt, an advantage over automated single-clutch manual gearboxes. The DSG® gearbox has tremendous controllability allowing for

- an optimal accelerating process that eliminates initial turbo-related loss of pulling power
- reduced gear selection time. Gear change is completed in only 40 milliseconds and several gears in up- or downshift can even be skipped
- the most efficient gear ratio
- reduced fuel consumption. Optimal gear selection mitigates the increased consumption of conventional torque converters.

Drivers of diesel vehicles know the advantages of a compression-ignition engine. Fuel consumption is lowered when gears are changed at the lowest possible revolutions. The DSG® uses this strategy in the TDI and TSI engines. The increased pulling power at lower revs ensures that the engine torque required is always available.

The idea for the dual-clutch gearbox was born in motorracing. Volkswagen began developing the technology for consumer use in the 1980s. When the first Volkswagen DSG® went into series production in

2003, it changed the industry. This innovation provided a previously unknown level of shift comfort. The once clear line between automatic and manual gearboxes had been bridged, and an extraordinary level of driving dynamics was achieved.

WHAT TOMORROW BRINGS

Driving into the future with Volkswagen

Volkswagen is leading the way in the future of mobility. Technologies, such as TDI and TSI will continue to remain dominant for a long time. Combustion engines, some supported by electric motors, pure electric drives and fuel cell systems will co-exist. At the end of this evolutionary chain is independence from fossil fuels. The Volkswagen Group has defined the path to this future in a convincing powertrain and fuel strategy.

IT'S ALL ABOUT EFFICIENCY

In the first stage of this path, it is important to use existing fossil fuels as efficiently as possible. Volkswagen has set the standard with its clean diesels, TSI engines, natural gas vehicles (EcoFuel) in Europe. We will continue to innovate with these technologies, while also looking to the future. Here we see the next step as obtaining fuels from renewable raw materials. Volkswagen is already innovating on this front, through our SunFuel technology. This fuel is from biomass and cellulose-ethanol, known as second generation bio-fuels.

The use of CO₂-neutral biomass can be used to produce these synthetic fuels. When used as a fuel in conventional diesel engines, SunFuel is able to reduce particulate emissions and nitrogen oxides by nearly 30 percent – even in older vehicles. SunFuel is the fuel for the next stage of our powertrain and fuel strategy: This strategy sees the use of new internal combustion engines powered by renewable fuels and without any major changes to infrastructure.

ELECTRIC TRACTION

Continuing along the path to the future, Volkswagen is researching and developing all potential drive types. This includes the hybrid drive, such as the one already being tested in a large study in Berlin, Germany. The Golf TwinDrive has a highly efficient combination of a new 1.5 liter common rail TDI, electric drive and dual clutch transmission (DSG®). In contrast to other hybrid vehicles of today, which can only cover about an average of two miles in pure electric mode, the Golf TwinDrive is able to cover about 30 miles in this zero-emissions mode. “Refueling” of this vehicle is simple – just plug it into an electrical outlet.

The fuel cell also shows the innovative force with which Volkswagen pursues its research: Volkswagen Research has developed a unique high-temperature fuel cell (HTFC) that eliminates the numerous disadvantages of previously known low-temperature systems. The HTFC is lighter, more compact, durable and economical. These are the decisive criteria for advancing the fuel cell toward mass production. The first prototypes of these vehicles are planned to be launched in 2010.

The future will then be part of our present.