



YOUR MOVE TO BETTER COMPETE

Lower your risks and gain more value with every
new energy project



CREATING A FUTURE IN NEW ENERGY MEANS INNOVATING IT TOGETHER TODAY

Welcome to the world of The Switch, where innovation and technology leadership capture the potential of the wind and other new energy sources. And maximize the output for high-quality energy.

The Switch is your core power-generating components partner, adding value by collaborating and networking to lower the cost of new energy for the market. We provide proven engineering designs to help you transition to new technology, scalable production and engineering capacity, and flexible business models. And we aim to create a brand-new world of new energy with you through value-added partnership.

Now is the time to switch to the right technology and partner for a brighter future

Our success has been built from making the most of new energy. With innovative people and cutting-

edge technology, our mission is to make sure that no potential power gets lost.

Customers come to us because they know we have the passion and skills to make things happen. This is proven by our concepts that ensure reliable future-proof grid compliance and maximized energy output.

Switch up to permanent performance

What makes us different is that we guarantee great results through genuine collaboration. As part of the big switch to new energy, we encourage you to move ahead with greater profitability.

1 Switch to smarter technology
Built-in simplicity, robustness and reliability with an optimized power-generating package

2 Switch to an out-of-the-box approach
Revolutionary solutions, unlimited production capacity and extended system lifetime

3 Switch to the company with the happiest customers
Ultimate customer satisfaction with our 100% focus on your business



CREATE BESTSELLERS PREDICTABLE TIME-TO-MARKET WITH THE LATEST TECHNOLOGY

Now you have the opportunity to create a bestseller with predictable time-to-market. The Switch provides streamlined processes and short lead times for customer projects.

Maximized energy yield and future-proof grid compliance

The Switch is a leading supplier of megawatt-class permanent magnet generator (PMG) and full-power converter (FPC) packages that effectively capture power from highly variable new energy sources like the wind, sun, and tidal and wave.

Transitioning to new technology for power generation guarantees that you get maximized energy yield and reliable, future-proof grid compliance.

Energy efficiency and more compact motor size

Our PMG and FPC solutions also offer unsurpassed benefits for marine, variable speed genset (VSG) and industrial applications.

Taking advantage of PMG and FPC technology in more established applications, such as onboard marine, enables you to lower energy consumption, decrease motor size and cut back on emissions. The technology also offers you greater adaptability for your specific solution.

Bestseller performance

In the wind industry, our optimized PMG and FPC packages produce efficiency levels up to 98% at the rated point. The true strength of PMGs is in partial load situations, where wind turbines operate most. PMG efficiencies remain close to nominal value over a wide range of speeds to produce more electricity.

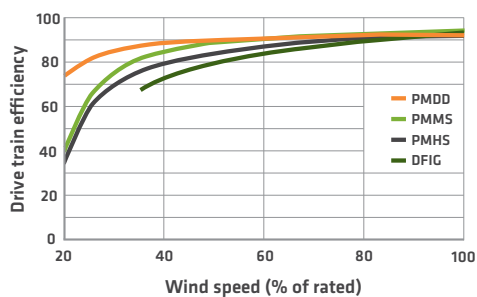
High energy yield, reliability and efficiency – this all helps you create bestsellers for your market.

The Switch adds value by improving your competitiveness

Our vision is to be the industry leader in new energy by being the partner of choice for multi-megawatt power generation.



THE SWITCH



The choice for more energy

When calculating the different drive train systems, PMG and FPC solutions are superior in every case.

LOWERING YOUR COST OF ENERGY IS ACTUALLY QUITE SIMPLE

Lower overall capital investment costs, equipment lifetime operation and maintenance (O&M) costs, and fuel costs while boosting the amount of energy generated. This formula becomes even more attractive with renewables – as the cost of wind, solar, wave and tide is free!

Raise annual energy production

High availability – The Switch has pioneered PMG technology for wind. Today, it is the choice of the market majority. PMGs ensure fewer failures since they have no wearing parts, are more compact and require only minimal maintenance. The Switch PMG drive trains typically enable average turbine availability of 97% or higher in all operating conditions.

Great efficiency curves – PMGs also demonstrate higher efficiency at partial loads, resulting in higher efficiency curves for wind and other renewable energy applications. They start producing power at lower speeds. Therefore, every The Switch PMG-based drive train delivers superior efficiency curves over the entire speed range.

Boost electricity quality

Superior grid connection – Our FPCs support fault ride-through (FRT) and fulfill the world's strictest grid code requirements, including the German BDEW 2008. They also provide low flicker, electrical noise emission and a total harmonic distortion (THD) of <1.5%, the lowest in the industry.

Minimize total life cycle costs

Capital investment – We seek to minimize total life cycle costs (TLC) by optimizing designs through close customer collaboration. Every solution is purpose-built for its specific operating environment to significantly lower lifetime O&M costs.

Operation and maintenance – All solutions from The Switch feature a highly serviceable design to speed up maintenance routines. Our remote equipment monitoring system and 24/7 technical support allow you to implement a proactive service plan, avoiding unexpected downtime and costly failures.

Extend equipment lifetime

Current designs from The Switch are already calculated to last more than 20 years. By lengthening the average lifetime of conventional technology with an additional three to five years, your cost of energy can be lowered dramatically.



Low-speed, direct-drive PMGs

No gearbox. Very low spherical rotor speed



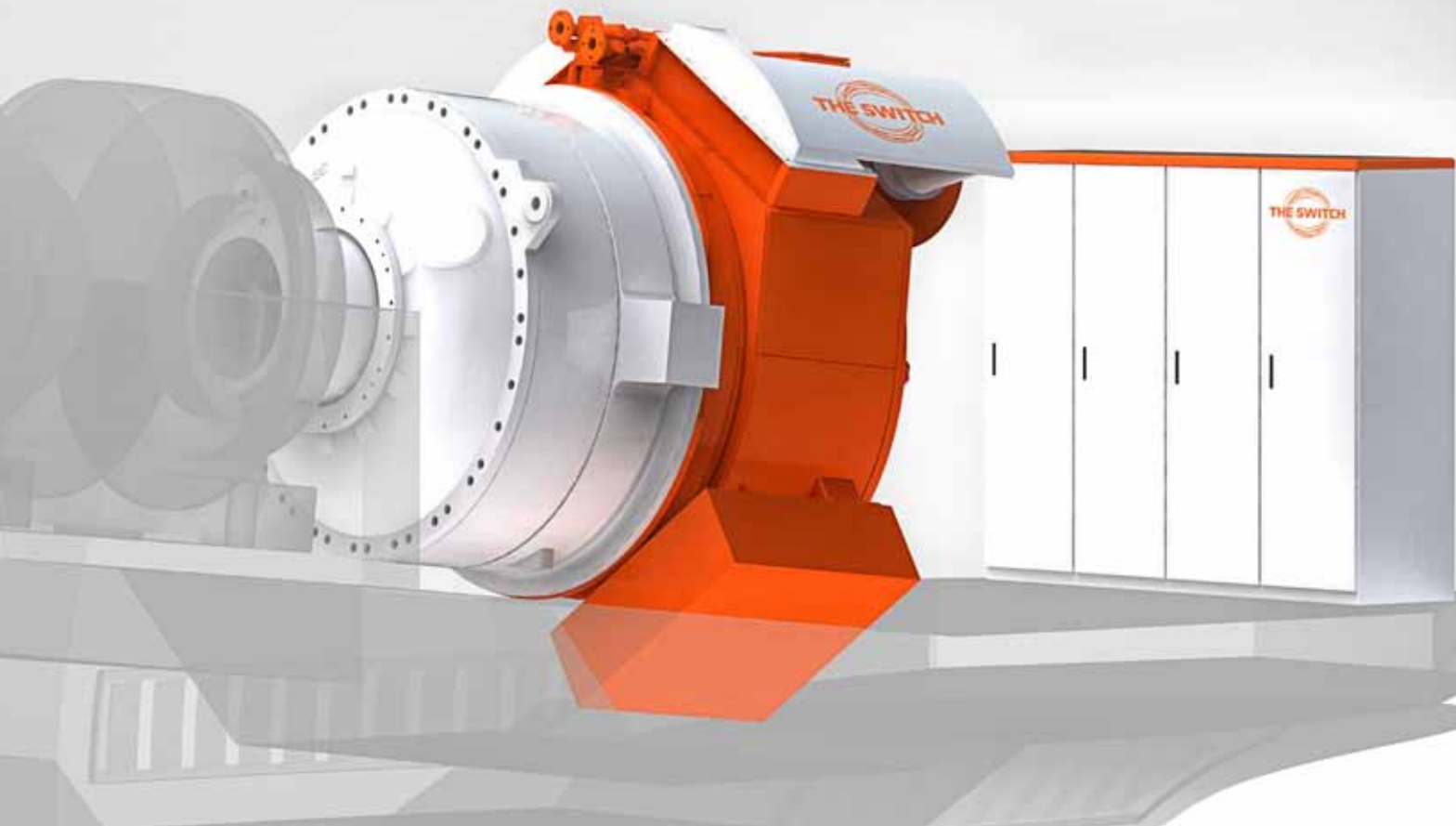
Medium-speed PMGs

Typically with a single- or two-stage gearbox. Fully integrated option, FusionDrive®, available



High-speed PMGs

Used with three-stage gearbox



ANY POWER. ANY SPEED.

A WIND OF CHANGE

We have challenged the wind industry, first by making PMG technology the preferred choice by turbine manufacturers and now by enabling the technology to be commercially available.

We delivered the world's largest direct-drive PMG at its time in 2007. We became a global market leader in FPCs in 2010.

Today, we continue to make our portfolio of PMGs and FPCs the broadest of all: any power, any speed.

Permanent magnet generators

The Switch PMGs cover all wind power applications from 1 MW to 8 MW and higher. Our product portfolio includes direct-drive, medium-speed and high-speed PMGs.

Each PMG is designed with special, patented magnet shapes and arrangements to match specific wind conditions. This guarantees smooth operation and maximum efficiency. By eliminating cogging, we have reduced mechanical stress, improved reliability and extended the turbine's overall lifetime.

Our PMGs provide excellent availability and productivity. Their specially segmented structure creates a group of redundant generators capable of independent operation.

Full-power converters

The Switch FPCs are optimized to work with a range of PMG concepts. Designed for the highest level of performance, the robust line inverters ensure future-proof electricity quality to meet the ever-stricter network requirements for harmonics, flicker and FRT.

Lightweight construction, modular power packs with liquid cooling and highly customizable software allow our converters to match all turbine designs and wind conditions. The rugged design provides exceptional fault tolerance and grid support through FRT functionality.

Our FPCs enable easy power factor control, so that all the current can be used for active or reactive power generation. This allows for a 100% reactive power feed, even in the absence of wind.

Not as sensitive to changes in the network as traditional converters, The Switch FPCs offer advantageous control flexibility to adapt to ever-changing operating conditions.

MOVING INTO OTHER NEW ENERGY AREAS

Solar – Premium outdoor solutions

The Sun Switch is a unique outdoor inverter and controller package for photovoltaic (PV) systems that boasts utility-grade performance with the same cost effectiveness and improved levelized cost of energy (LCOE) already achieved for wind.

Every feature of The Sun Switch has been designed to maximize the energy produced from the sun, even with

partial or uneven radiation. This allows our inverters to harvest more power from the PV panels and produce more high-quality energy for the grid.

The Sun Switch is purpose-built to work reliably in harsh conditions, eliminating additional housing, filtering and losses. The inverter features a unique IP 66/NEMA 4 outdoor design and totally self-contained liquid-cooling system for simplified installation and maintenance.





Marine – Onboard applications, wave and tidal

The marine business consists of two sectors where The Switch solutions provide exceptional advantages: marine, and wave and tidal.

For onboard marine applications, the biggest advantages of The Switch technology are energy efficiency and adaptability. Our permanent magnet (PM) technology is ideal for propulsion and other machinery as well as onboard generators. Ship owners can save hundreds of thousands of euros each year by

transitioning to variable speed PM technology because fuel consumption is lower and motor size is more compact.

For winch applications, The Switch technology enables better torque with a wider speed range, from zero upwards.

For wave and tidal, we offer cutting-edge technology that opens up new opportunities.

EFFICIENTLY GENERATING AND USING ENERGY

Variable speed genset electrical drive trains

With the rapid growth in demand for reliable electricity and the deregulation of utilities, VSG electrical drive trains are becoming more widespread.

Using a VSG electrical drive train for distributed power generation is a relatively new approach that delivers the variable speed advantage of running a generator on partial loads from 50 – 100%.

VSGs are ideal for distributed or on-site power generation. An entire VSG system includes a natural gas-fired engine, a PMG, a heat collection system and a VSG converter.

Our optimized VSG electrical drive train package, consisting of a PMG and VSG converter, meets the strictest grid interconnection requirements and provides high-quality electricity.





Industrial applications – Permanent magnet and solid rotor induction machines

The benefits of The Switch PM motors for special industrial applications include energy efficiency and compact ruggedness.

They are an ideal choice for oil and gas, energy or other industrial applications that need high torque over the entire speed range. In addition, we offer you the adaptability to design each product in a flexible manner

to match your specific operating requirements.

Our second generation solid rotor induction machines increase performance and broaden speed and power ranges, while offering improved mechanical strength to handle vibrations better.

The Switch optimized drive train is a speed-controlled solution that allows designs for a wide speed range, including the possibility to omit the gearbox.

REFERENCES THAT ARE SWITCHED ON

Wind

Our direct-drive 4.25 MW PMG and FPC solution for GE, originally ScanWind, started up in offshore-like conditions in 2011. This is our third generation direct-drive PMG drive train since 2005.

We have delivered over 4,000 FPCs to Goldwind since 2007. The capacity for rapid ramp up to large-volume deliveries was ensured by a multi-factory approach.

Our first 5 MW drive train packages were installed at the start of 2013 and are successfully operating for Chongqing Haizhuang Windpower Equipment's offshore wind power project in China.

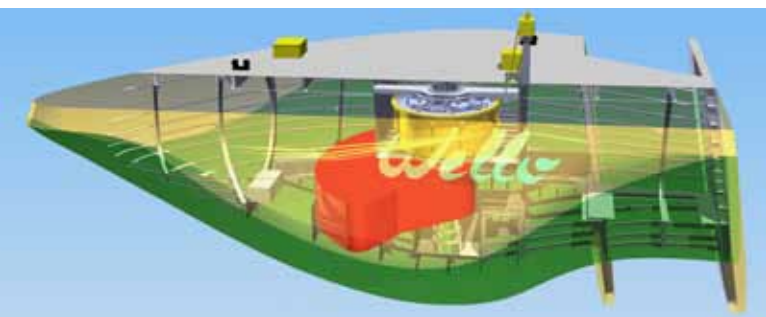
We are manufacturing more than 100 direct-drive 3 MW PMG and FPC packages to be used in PROKON's P3000 turbines.





Solar

In 2008, The Switch successfully installed its first 140 kW liquid-cooled solar inverter for Solar Systems in Australia on time and on budget.



Marine

In 2011, we delivered a PMG and FPC package for the Wello Penguin, a unique wave power application.



Variable speed genset electrical drive trains

New York State approved The Switch as a preferred supplier of VSGs thanks to the proven energy efficiency and reliability of installations such as Manhattan's One Penn Plaza.



Industrial applications

Swiss MAN TURBO selected The Switch to develop a uniquely rugged high-power compressor for a gas storage application installed on the seabed.

GROW CONFIDENTLY BUSINESS MODEL TO COMPLEMENT CUSTOMER STRATEGY

Embracing a networked approach has been the hallmark of The Switch from the start. You can scale your operations and move from fixed costs to controllable overhead – ultimately lowering risks.

Model Factory for most networkable approach

An ideal example of our networkable approach is our Model Factory concept. It aims to support customers in moving into new production areas quickly, flexibly and effectively.

The Model Factory makes it easy to set up production in new locations and create local jobs at locations that are logistically convenient to end-customer sites. It ensures better results with fewer variations through a highly systematic method of working and offers an optimal solution for projects in different life cycle stages.

More capacity than you might think

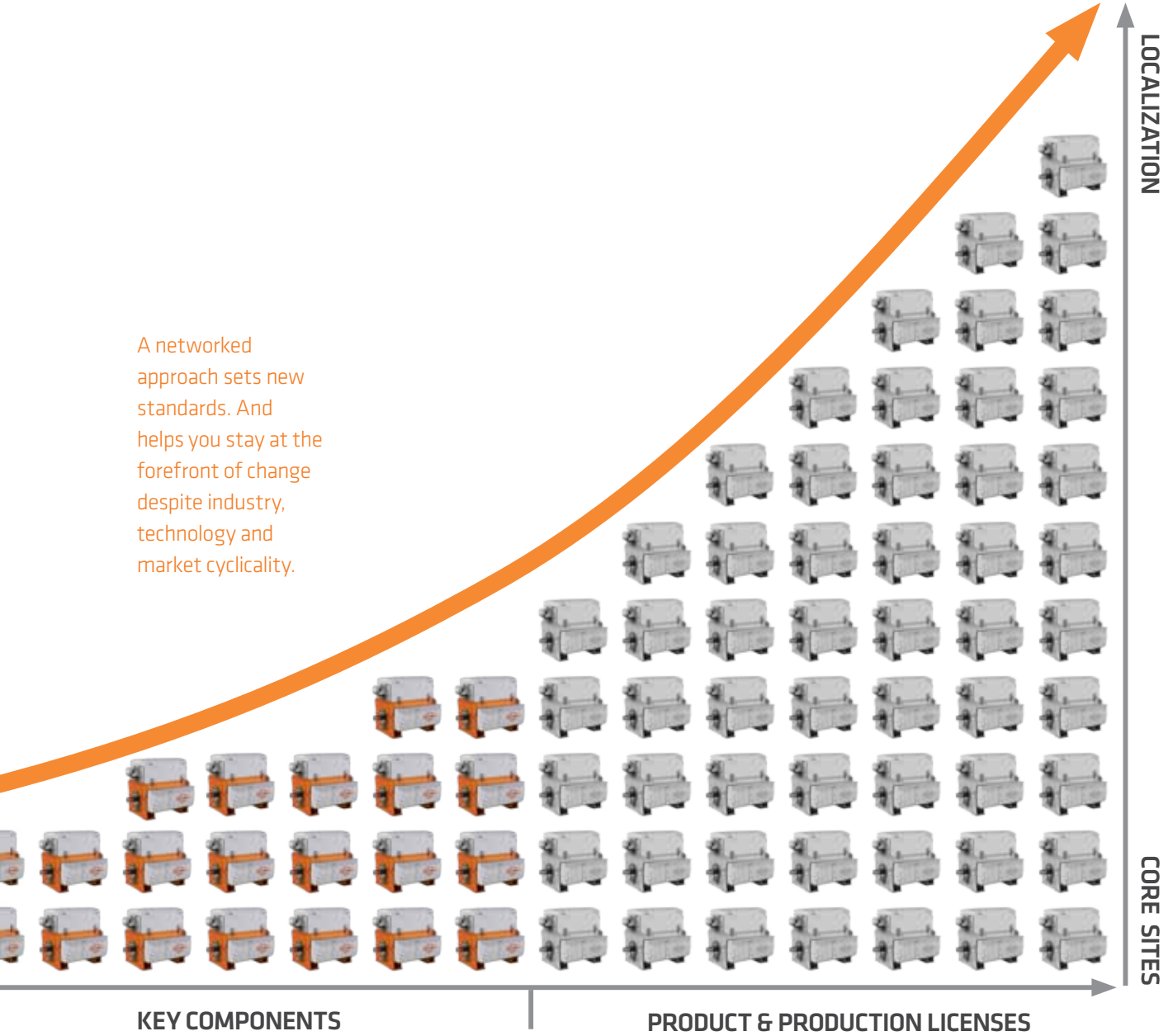
Our Model Factory concept fully supports your production processes, so you can ramp up or down in a flexible manner. Or we can even start regional production cooperation with you. This ensures that your production costs are always kept in check – and gives you more production capacity than you might think through our careful partner selection.

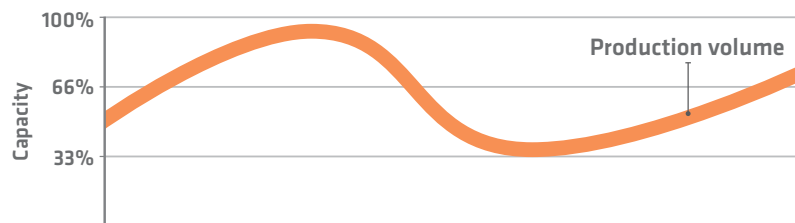
Agile thinking shows the way forward

The next stage of the Model Factory is to move towards dynamic agile manufacturing thinking. While the Model Factory has provided a very systematic way to make consistent instructions for production technology and localization, agile manufacturing builds long-term partnerships among R&D, suppliers and customers.

In agile manufacturing, customers, suppliers and suppliers' suppliers share the same goals of reaching the same viable solutions. It creates a more dynamic way of collaborating by having all parties share in the ultimate results.







Production volume varies from 33 - 100%, representing an industry overcapacity of over 50%

LOWER YOUR RISKS SCALE YOUR OPERATIONS BY NETWORKING

Thanks to our unique and flexible business model, our customers have been able to carefully manage their risks, complement their capabilities with additional expertise – and grow confidently.

Complete products, key components or licensing

The Switch flexible business model offers several options. We can manufacture a complete and ready-to-use product for you – either one that is already commercially available or a solution that is tailored to your needs. Or you can insource specific components and even acquire licenses.

Whatever you choose, we can provide a platform for collaboration that allows you to advance step by step with production and processes that support you with greater profitability.

Advantages of using The Switch core sites or more localized production

When starting out, tapping into production at The Switch core sites offers the benefits of low risk, high efficiency, quality assurance and sufficient capacity.

When you need more localized content close to your end market, we can supply you with preplanned localization

support. Moving from an all-inclusive package to a more localized approach gives you the opportunity to gain from localized sources, favorable labor costs and simplified logistics.

Flexibility every step of the way

Our flexible business platform shortens time-to-market, allows our customers to focus on the areas of their business that bring them the greatest results, and enables them to gradually localize their offering.

Every step of the way, we're there to support you with the right components, products, technologies or licenses to give you the greatest value for your business.

Services to support you

Our person-to-person services are tailored to your needs to extend the system lifetime of your equipment through solution simplicity, fewer parts, less maintenance and highest availability. We guarantee you the highest achievable reliability and productivity.



THE WORLD OF THE SWITCH

We aim to be the technology leader for electrical power conversion.

www.theswitch.com