Challenges and future roles of DSOs in a decentralized electricity system

University Duisburg-Essen

Essen, 27 September 2016

EWE netz

Our high-quality distribution grids supply over two million customers in northern Germany

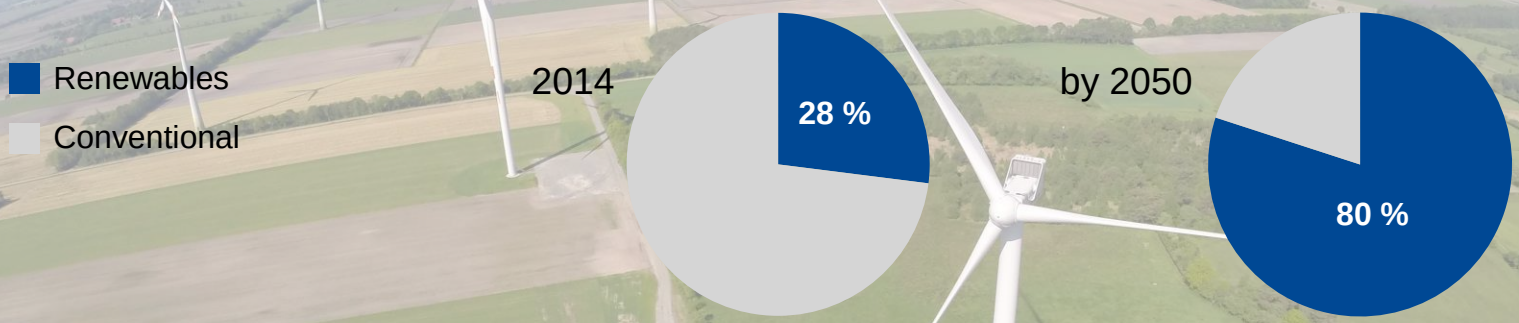
We at EWE NETZ are obliged to develop and operate

- reliable electricity grids
- safe gas grids
- modern telecommunications grids
- superior drinking water grids

EWE NETZ is decades ahead of the German government's renewable energy targets

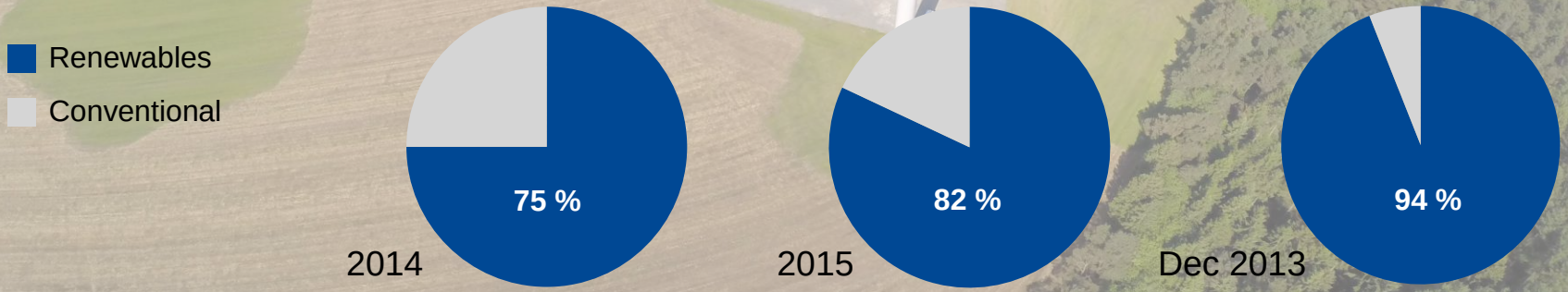
German government's expansion targets aim for 80 % renewable energy in 2050

Share of electricity generated from renewable and conventional energies



EWE NETZ: Today, >80 % of the energy in the grid from renewable sources

Share of electricity generated from renewable and conventional energies in the EWE NETZ grid



The energy transition implies:
The transformation of our infrastructure!

ENERGY TRANSITION

the energy transition =
the KICK to digitalisation

DIGITALISATION

digitalisation = the INCUBATOR
for the energy transition

What roles do the distribution network operators have to play and what is their agenda in the context of digitalisation and the energy transition?

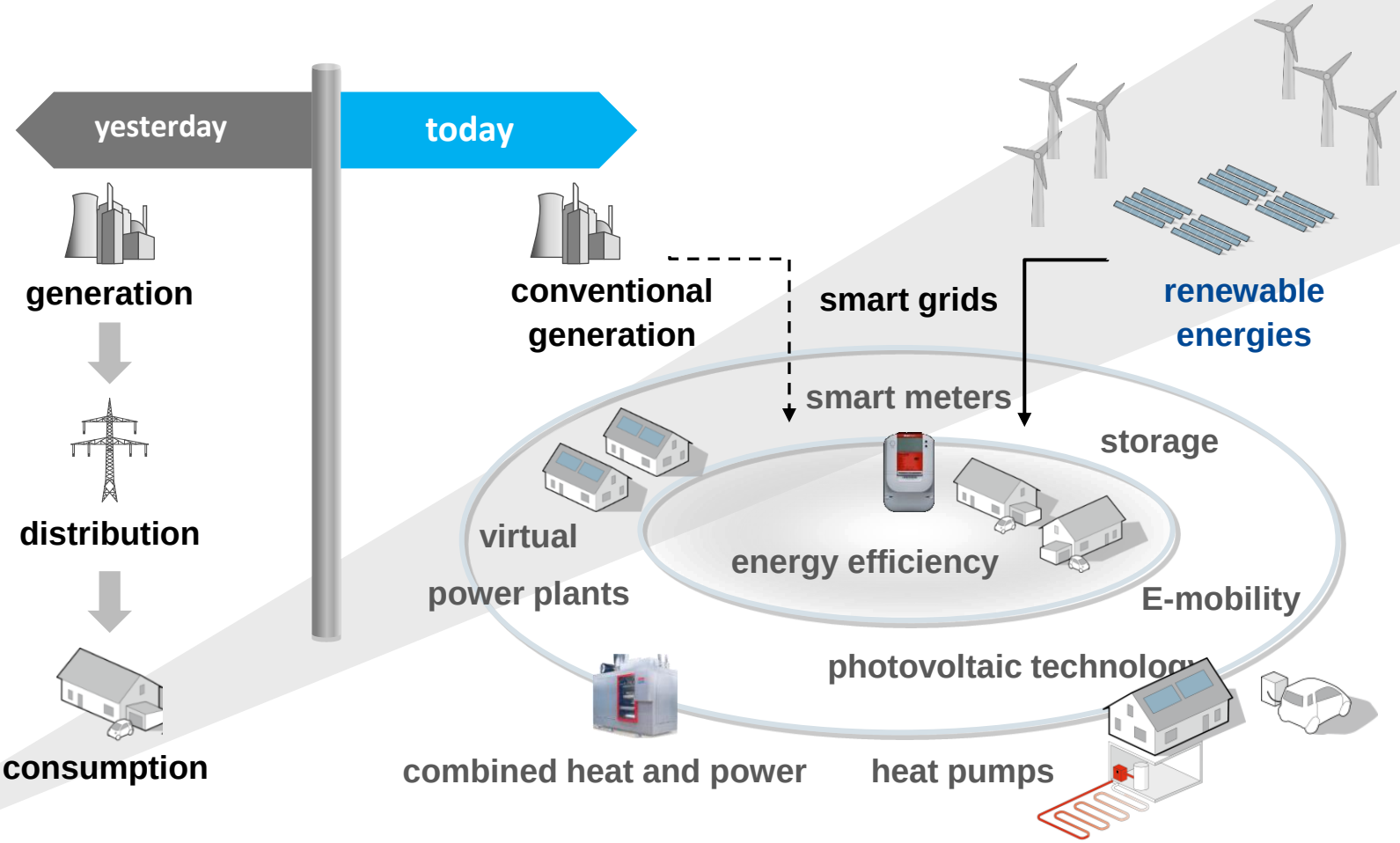
DSO's role – European Tendencies

ACER – "A Bridge to 2025" – DSO's role in 2025

ACER
Agency for the Cooperation of Energy Regulators

- A neutral supporter of the market: the **DSO has the purpose of encouraging the development of market-based services** provided by 3rd parties
- **DSO's role** has to be consistent with its responsibility of **maintaining reliable network operation**
- **The need for coordination will increase between DSOs** and **TSOs**
- **DSOs should increase security of supply** in the context of existing and future hazards for **supply reliability** (including cyber security)
- **DSOs** should **ensure protection of customer data**
- **DSOs** have to be able to adapt their **network expansion to the new requirements** (charging poles for E-cars: gas stations for gas-driven cars) **even by** deploying **smart grid solutions** for improving the way decentralised generation systems are integrated.

Our mission: DSOs act as neutral and efficient infrastructure service suppliers for the market



The roles of DSOs increase in size and complexity

Key roles of DSOs

1. ***Plan, build and optimize the grid infrastructure*** *according to the market's needs*

2. ***Connect new customers to the grid*** *and manage grid fees in a non-discriminatory way*

3. ***Operate the grid*** *in a safe, secure and efficient way*

4. ***Provide system services*** *from the distribution grid for the energy system*

Optional roles of DSOs

Metering and SM-gateway administration

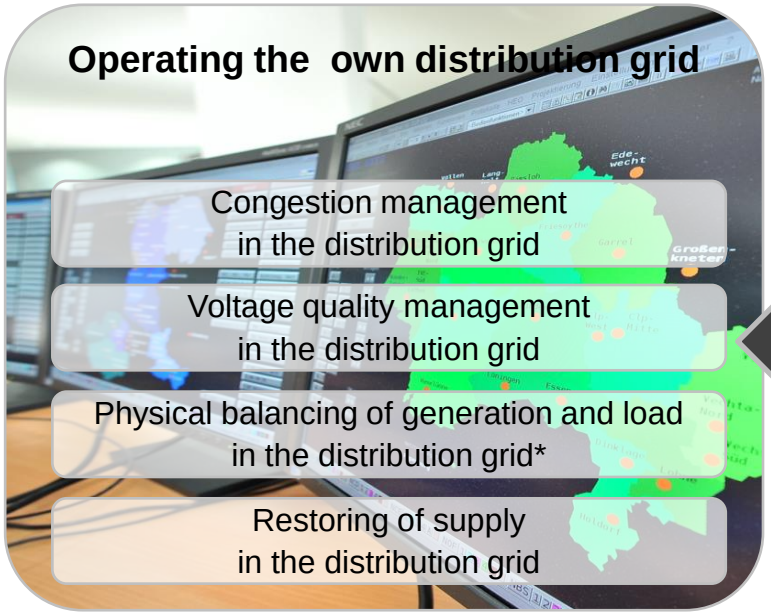
Plan, build and operate e-mobility infrastructure

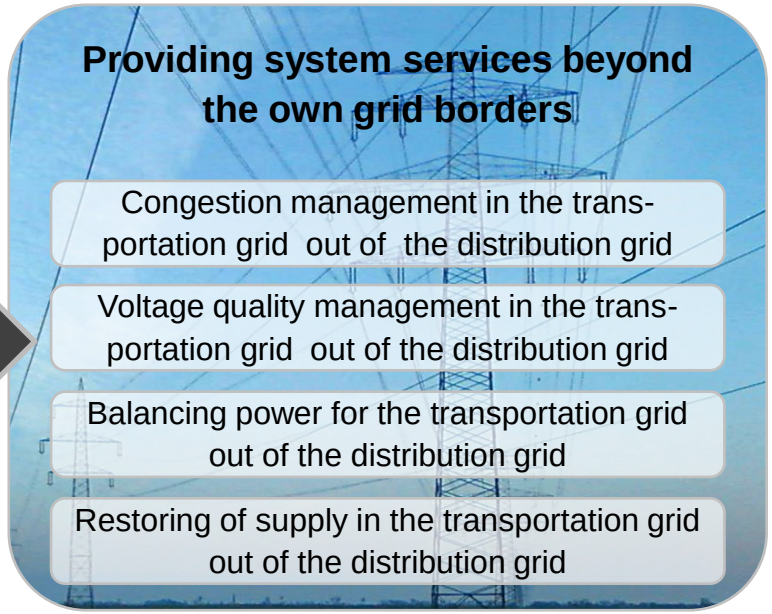
Plan, build and operate digital communication infrastructure

…

DSO's responsibility: Providing system services beyond the DSO grid borders

In a decentralized electricity system, the system stability can only be ensured with DSOs





* For separated, cellular subsystems

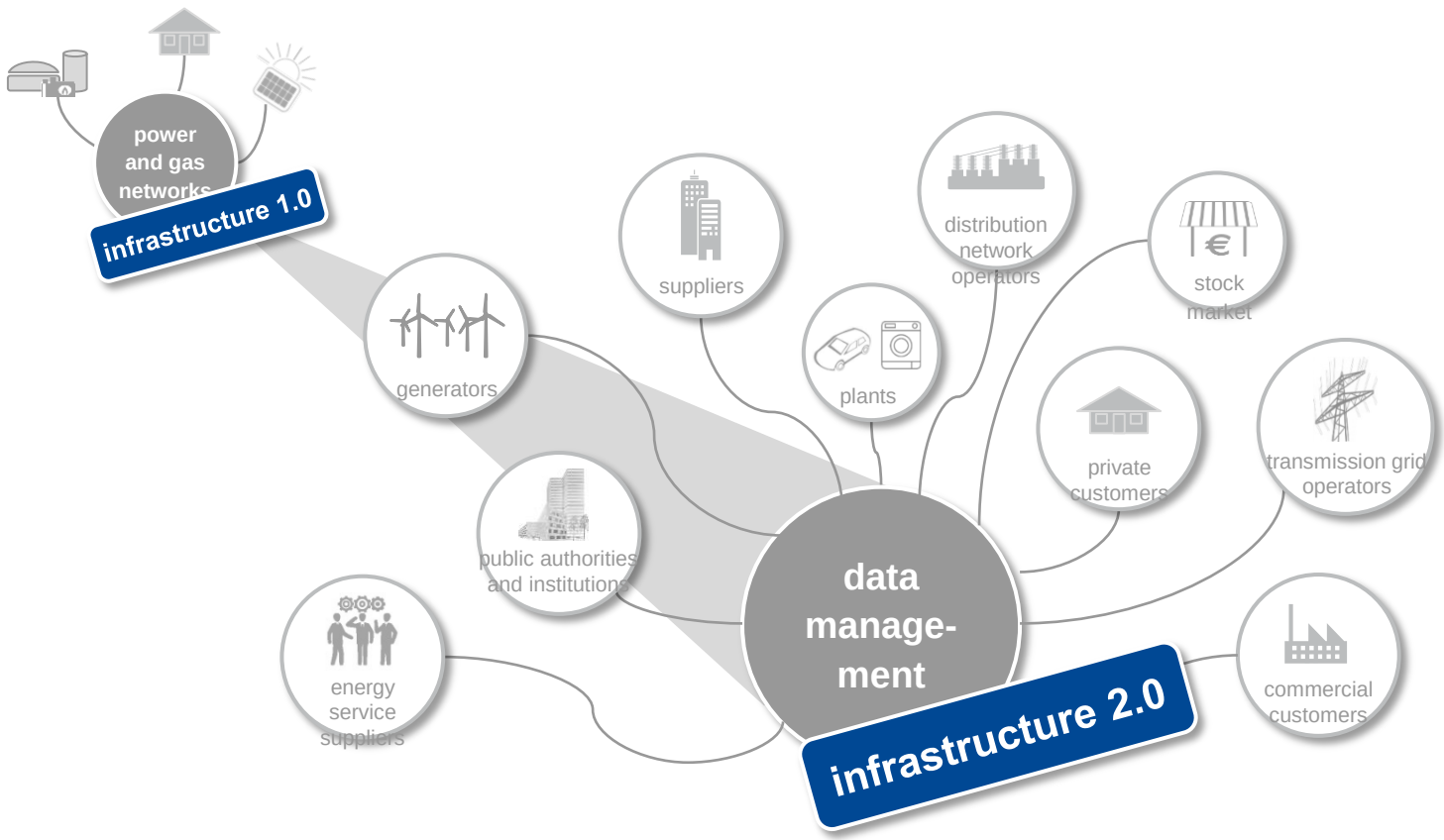
Highly efficient communication between DSOs and TSOs required

Evolved TSO-DSO data management required – DSO and TSO have agreed on common principles

Report of the *TSO-DSO project team on data management presented to EC*

- Clear **need for improved TSO-DSO data management identified** in five use-cases:
  - Congestion management
  - Balancing
  - Use of flexibility
  - Real-time control and supervision
  - Network planning
- **Shared key principles of TSO-DSO data management**
  - Guarantee data privacy, data / communication security
  - Guarantee a fair, equal access to the data / information
  - Deliver a non-discriminatory processing of the data
  - Be of proven cost efficiency, as accepted by the National Regulatory Authority (NRA).
  - Facilitate innovation by opening, as much as possible and legally allowed, the access to the data

Data becomes key for system operators to optimize the network



DSOs must be responsible for data management and communication within their own network

DSOs must be fully responsible for switching and operations in their own grids

How could a system look like, where multiple operators may try to conduct the system in the same node?

DSOs will increasingly take advantage of flexibility for efficient network operation

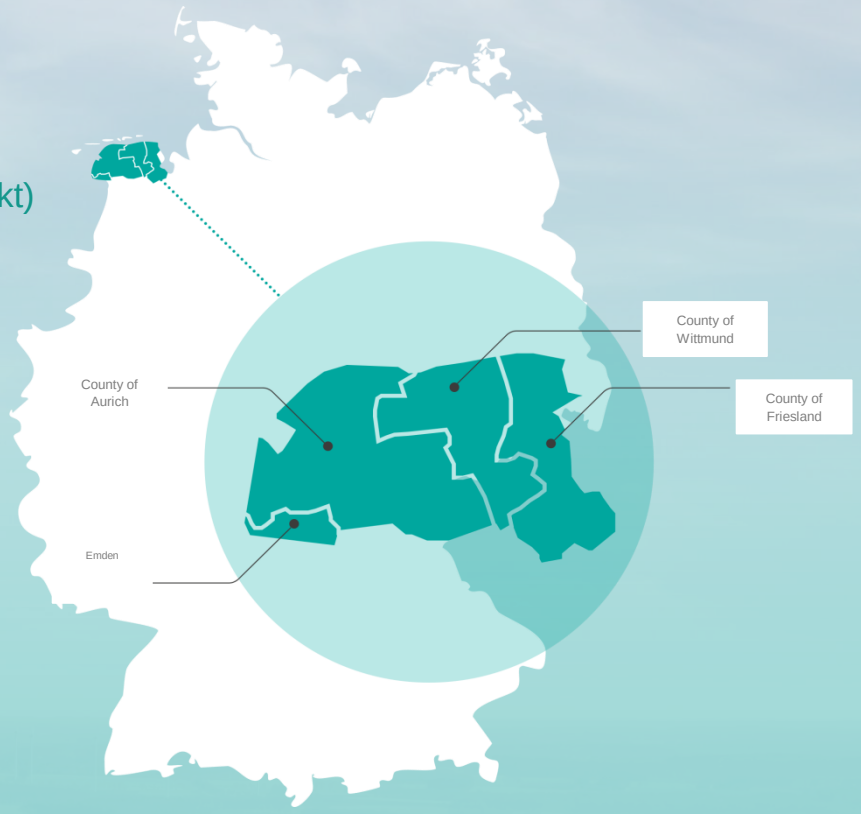
Grid and system state	DSO activities
System stability endangered • Acute congestion or overload • Market flexibility exhausted	• Non marked-based congestion management, e.g. by peak load capping
Congestion foreseen • Some system states • Market flexibility available	• Marked-based congestion management, e.g. by buying flexibility
Normal operations • Generation and consumption balanced by market participants • Sufficient reserves and market flexibility available	• Optimized grid control • DSO acts as a market facilitator through grid enforcements

An active grid optimization is the responsibility of the DSO – including the choice of the right tools and flexibility measures

enera - The next big step towards a sustainable world

The „Smart Energy Showcase“ in northwestern Germany

- Countries of Aurich, Friesland & Wittmund
- Independent Cities of Emden and Lingen (Lastschwerpunkt)
- Area of 2.665 km2
- 390.000 inhabitants
- 200.000 households
- 1,75 GW installed renewable energy generation capacity
- 1,50 GW generated wind power
- 170% renewable energy



The model region is a large renewable power plant!

www.projectenera.com

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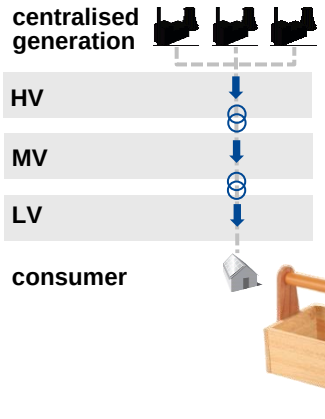
Conclusion: DSOs are shaping up for success in the energy transition

DSO 1.0

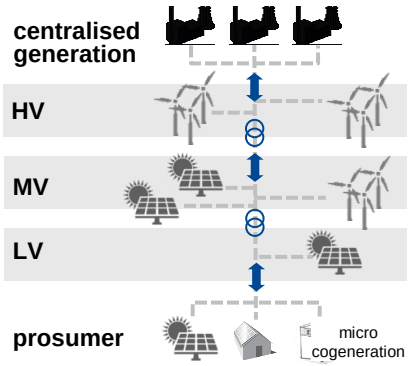


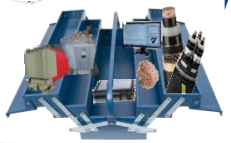
past

from the generator

to the consumer

DSO 1.5



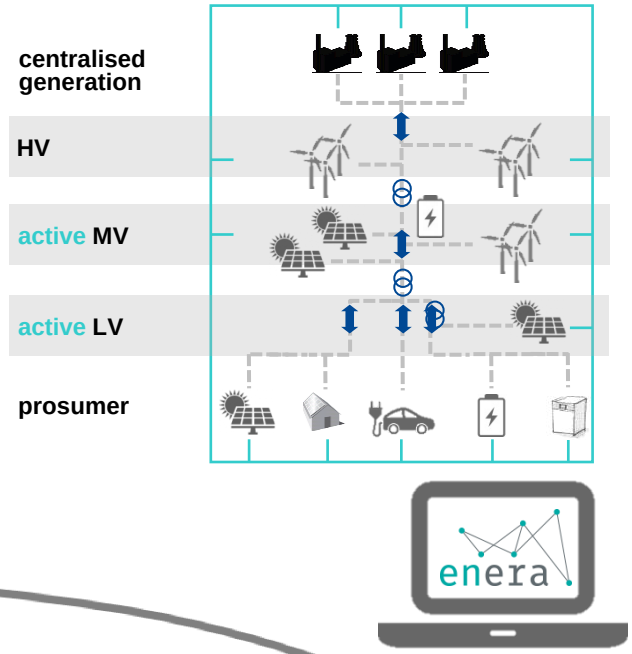


today

streamlining the classical network business

→ integrating decentralised generation

DSO 2.0



tomorrow

system manager with new roles through the DSO

transformer
energy flow

Thanks for your attention

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