



International Association of Public Transport
Union Internationale des Transports Publics
Internationaler Verband für öffentliches Verkehrswesen
Unión Internacional de Transporte Público

Where we stand in Europe today? The ZeEUS project

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Contents

Some initial thoughts

Fleet composition and Tendencies

EU Recent activities

UITP and electromobility

ZeEUS

Why electric?

Efficiency point of view

Efficiency Focus!

Some countries are close to CO₂ neutral electricity.

But there is not enough CO₂ neutral fuels

Source: VOLVO

By making electricity from alternative fuel rather than burning it in a IC engine, we can do this:

With energy for one year of service with a bus using..

An electric bus can drive X years If the fuel is made to electricity.

Biogas

3 Years

Ethanol

2 Years

Biodiesel

2 Years

Diesel

2 Years

Where do we go?



250 contacts

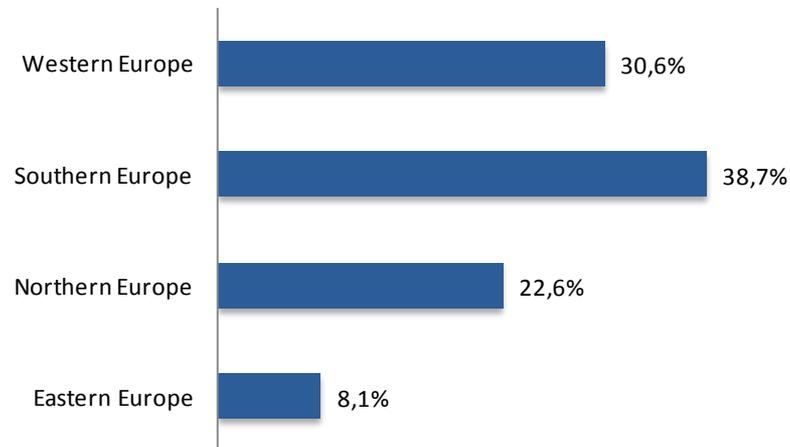
Municipalities, PT Authorities, PT Operators

65 answers / 25 Countries

Around 70.000 buses / trolleys

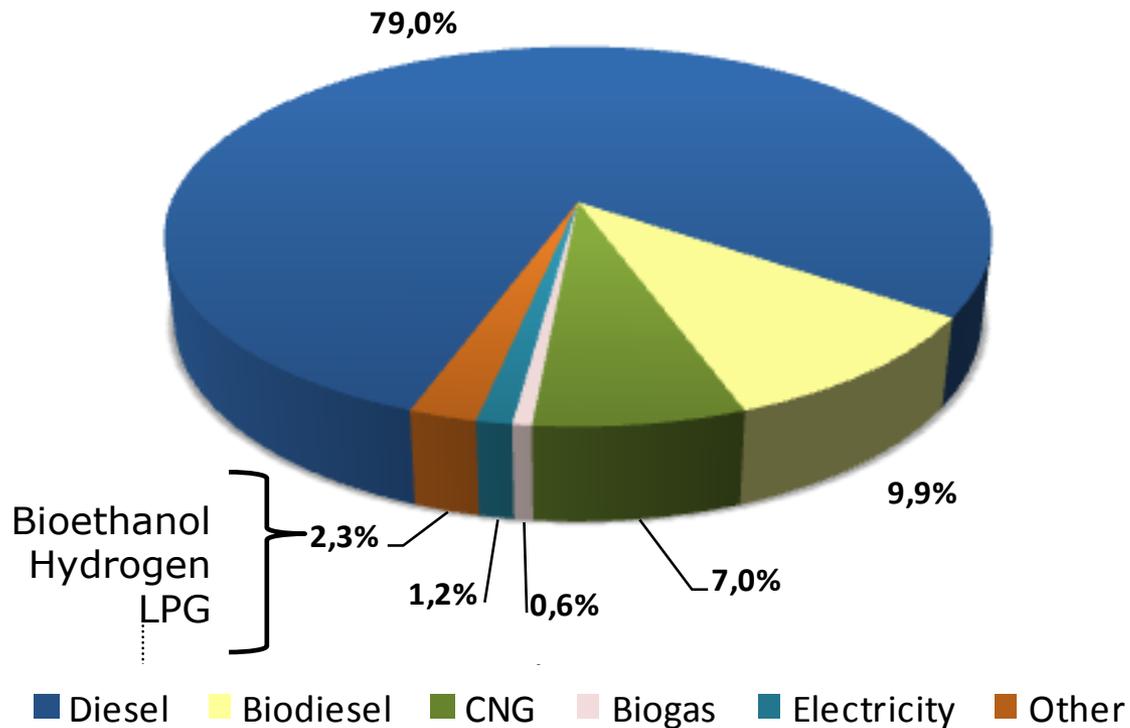
Around 160M habitants

Survey about the actual implementation of Bus System strategies in Europe launched last July



Fuel and energy

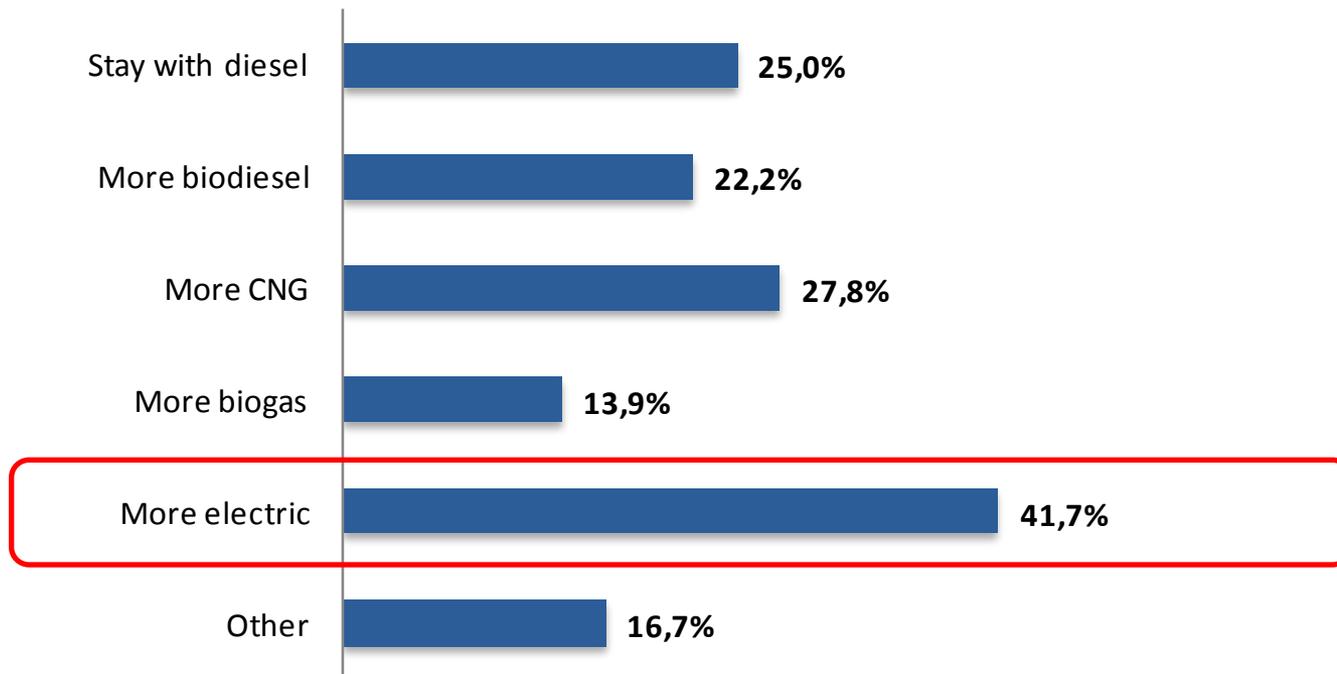
Which propulsion in the fleets today



Average bus fleet breakdown per fuel or energy used

Fuel and energy

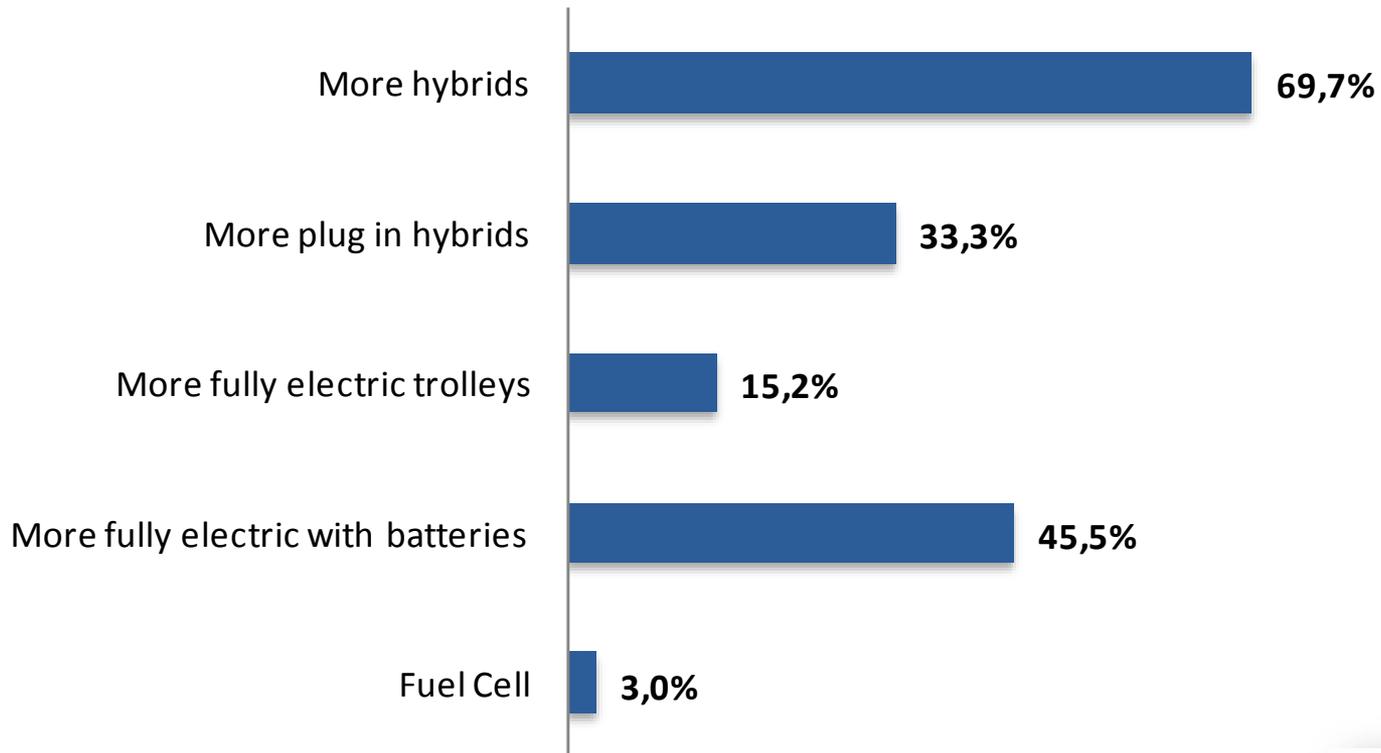
Future plans about propulsion for buses



Respondents distribution according to future plans to change fuel or energy used ratio
- *Whose who are going to change, in which direction will change? -*

Propulsion System

Focus on Electric propulsion shift



Respondents distribution according to future plans to change propulsion system ratio

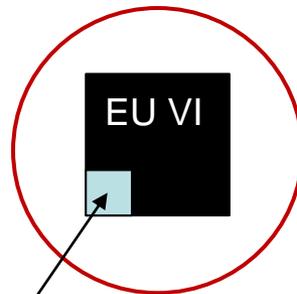
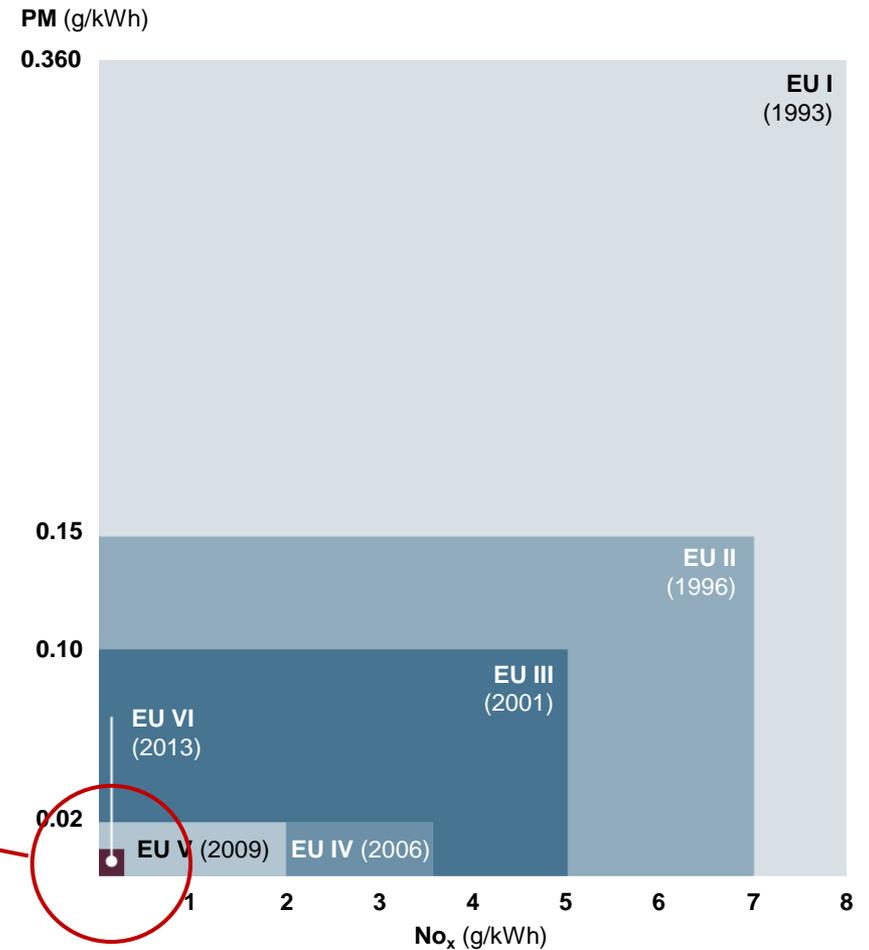
Legislations

**Hundredfold
improvement
since 1993**

**Next step
legislation: Fuel
consumption and
CO₂ emissions**

**Old vehicles are
the main issue**

Source: VOLVO



On road Plug-in
emissions

Activities in EU

EU Clean power for Transport package

EU Directive on Alternative Fuel Infrastructure

Multimodality - push

Standard for Bus Plugs - future

EU Funded Projects

HCV (second generation hybrids)

- HUF (Hybrid User Forum)

TROLLEY project

HORIZON 2020

Hybrids, electric, CNG, bus efficiency...

Other activities in Europe

Several pilots stimulated by industry

- New-comers and/or ex-European

Some initial purchases

- Very few 12 meters or more

UITP and new propulsion, a long story...

The high cost of horses' vs. electricity traction was one of the key topics discussed at the UITP's Berlin Congress in 1886.



UITP approach to CO₂ emission reduction of urban mobility

UITP together with the European public transport undertakings and bus manufacturers jointly produced an approach to “**decarbonisation of transport**” and GHG emission reduction:

Modal shift: the best carbon reducing strategy

Traffic management

Infrastructure and operational issues

Smart energy use in vehicles

Cleaner / Electric Buses

Combined mobility



UITP activities

UITP Bus Committee

UITP SORT

Standard On-Road Test Cycle

SORT-Hy Validated

SORT-E in development (2014)

Trolley Working Group

Monitor, promotion, lobby actions

FTSO

Fuel Traction-Systems Observatory

Monitor different fuel technologies uptake worldwide

EU Research and Innovation Projects

UITP Relevant Projects

EBSF (European Bus System of the Future)

Technical analysis of technologies

Analysis of possible reuse of Public Transport electric energy infrastructure for charging public and private electric road vehicles

3iBS (innovative, intelligent, integrated Bus System)

Energy Sustainability

SORT Hybrid certification

iBS Roadmap

Chapter about energy sustainability

Electric bus systems main research areas

Provided as input to Horizon 2020 preparation

ZeEUS

ZeEUS – Zero Emission Urban bus Systems

Extend fully-electric solution to the **core part** of the urban bus network

Evaluate the economic, environmental and societal **feasibility** of electric urban bus systems

Facilitate the **market uptake** of electric buses in Europe

Demonstration Project
13.5M€ EU fund (22.5M € total)
42 Months duration

Coordinated by UITP

40 Consortium members

Start 1st November 2013

ZeEUS Launch event on
23rd January 2014 in Brussels

www.uitp.org



ZeEUS – Objectives

ZeEUS aims to be the main EU activity following experiences and developments of electric urban bus systems

Extend fully-electric solution to the core part of the urban bus network

Core Demonstrations

Observatory of Electric Urban Bus Systems

Networking

Guidelines and Tools for Pre-Commercial Support

ZeEUS - Philosophy

Extend fully-electric solution to the core part of the urban bus network

Consolidated solutions for electric bus systems are already today on the streets.

trolley-buses, mini-midi full-electric, diesel-hybrid busses

The market for these solutions has already been already developed

ZeEUS looks to the **next challenge!**

Development of vehicles of larger capacity (12m and more)

From **plug in hybrid** to **full electric** technologies

Focus on vehicles with **interaction** with the grids

Bus depot, stations and stop

Optimisation of operation and infrastructure

ZeEUS Core Demonstrations



8 Demonstrations / 6 Countries

South Europe - Barcelona, Rome

Mid Europe - London, Muenster, Bonn, Piltzen

North Europe - Glasgow, Stockholm

35 electric buses 12 meters

Hybrid plug-in

Full-electric

Trolleys with batteries

Charging points

Slow charging / Fast charging

Overnight / Opportunity

Bus depot, stations, terminals, stops

Induction, catenary, contacts

Involved OEMs

Alexander Dennis, Irizar, Skoda,
Solaris, Volvo, VDL

● Core Demonstrations



ZeEUS Electric-Bus Observatory 1/2

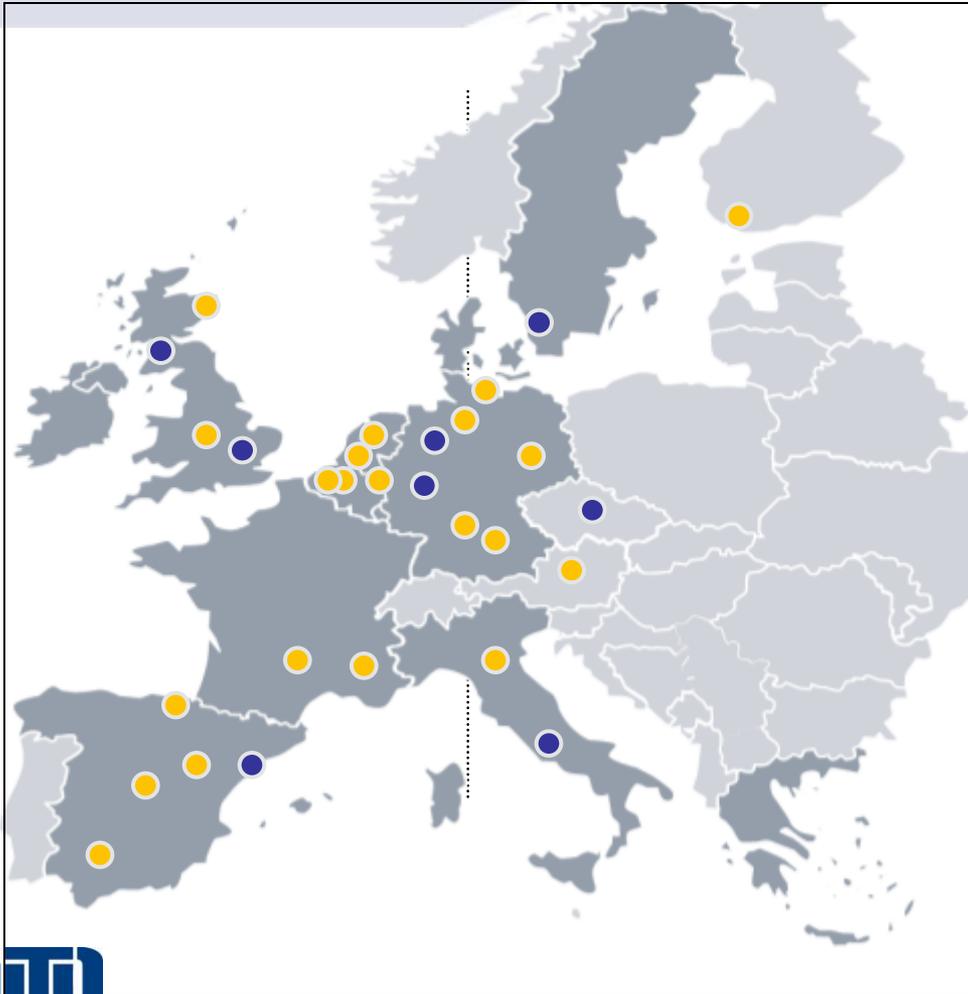
Next years will be characterised by:

- More tests, pilots and purchase of electric buses
- Development of new solutions for electric buses
- Battery / technology evolution

For this purpose, the **ZeEUS Electric-Bus Observatory** is created looking to what happen “outside” (and worldwide) ZeEUS:

- Demonstrations and pilots funded by other National or European programs
- Purchases of electric buses
- Key research & development activities about electric urban buses

ZeEUS Electric-Bus Observatory 2/2 – Initial interest collection



Leipzig, Hamburg, Augsburg,
Osnabrueck, *Mannheim* (Germany)

Den Bosch, Utrecht, *Maastricht*
(Nederland)

San Sebastian, Madrid, *Seville*,
Zaragoza (Spain)

Parma (Italy)

Grenoble, *Albi* (France)

Helsinki (Finland)

Milton-Keynes, *Aberdeen* (UK)

Wien (Austria)

Knokke, *Kortrijk* (B)

+ *ARRIVA*, *KEOLIS*



● Core Demonstrations

● Monitored/Observed Demo in list

ZeEUS Monitored/Observed Demos

Want to propose
a **Monitored /
Observed**
demonstrations?
Contact me! -
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Observed Demonstrations

As members of ZeEUS Electric Bus Observatory contribute to the analysis of key project topics

Monitored Demonstrations

Selected periodically within the Observed Demonstrations

More active participation to ZeEUS project

Local use of some KPI within the set defined by ZeEUS

Contribute to the UITP E-SORT validation

ZeEUS Networking Activities

ZeEUS aims to be the main EU activity for following experiences and developments of electric urban bus systems

Developments, pilots, demos, procurements

Observatory of electric bus systems activities

EU Projects and Initiatives

Bus involving Projects (CAPIRE, 3iBS...)

Initiatives (Smart Cities & Communities, EGVI)

Private transport electromobility (Green-eMotion)

Electromobility in Freight transport (FR EVUE)

Urban electro-mobility Stakeholders

European Electro-mobility Observatory by EC

Joint Forum with private and freight electromobility

European Associations & Networks

Members Forum (POLIS, EARPA, HyER...)

Outreach of the Electricity Industry (EURELECTRIC)

UITP members network

UITP Commission and Committees (Bus, Industry...)

ZeEUS PT Working Group

Involvement of Y4PT (Youth for Public Transport)

Liaison with UITP Regions



ZeEUS - Guidelines and Tools for Pre-Commercial Support 1/2

Support decision Makers in deciding "if", "how" and "when" to introduce electric bus systems in the Public Transport network

Regulatory frame including operational aspects and standards

Link with proposed EU Directive on "*Deployment of alternative fuels infrastructure*"

Funding schemes, tools and procurement guidelines

Interaction with EIB and other funding entities

Recommendations for **urban / spatial planning**

Operational concepts and **migration scenarios**

Electric Bus System **Roadmap**

ZeEUS - Guidelines and Tools for Pre-Commercial Support 2/2

Support decision Makers in deciding "if", "how" and "when" to introduce electric bus systems in the Public Transport network

Strategy for **optimised interaction** with the power grid

Slow charging (overnight bus-depot)

- Optimised charging strategy / business model

Fast charging at bus-terminal / bus-stop

- Strategy for re-using existing PT power network

Standardisation

Identification of priorities for standardisation (WHAT?)

- Interfaces, protocols...?

UITP **E-SORT** Validation

- New chapter of UITP SORT cycle for full-electric



Training guidelines for PT personnel

Drivers, maintenance

Education

Education modules and workshops for university students

ZeEUS Launch event on
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Thanks for your attention!



Want to propose Monitored / Observed
demonstrations?

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