



## 44<sup>TH</sup> ASECAP STUDY & INFORMATION DAYS 2016

# GNSS Adoption for Road User Charging in Europe

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[www.asecapdays.com](http://www.asecapdays.com)

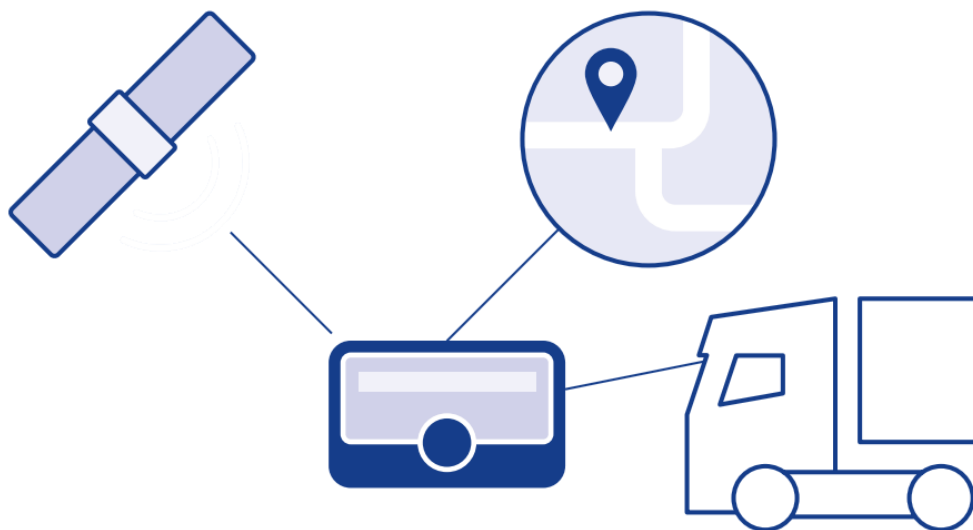


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The present presentation can be interpreted only together with the oral comment accompanying it

# Why GNSS for Road User Charging?



## FLEXIBILITY

Rapid changes can be implemented

## EXTENSIBILITY

Example of a network extension in 3 months

## REVENUE POTENTIAL

SP can include several VAS to their offer

## ENVIRONMENT (AND COST)

Around 80% less roadside infrastructure

## TRAFFIC MANAGEMENT

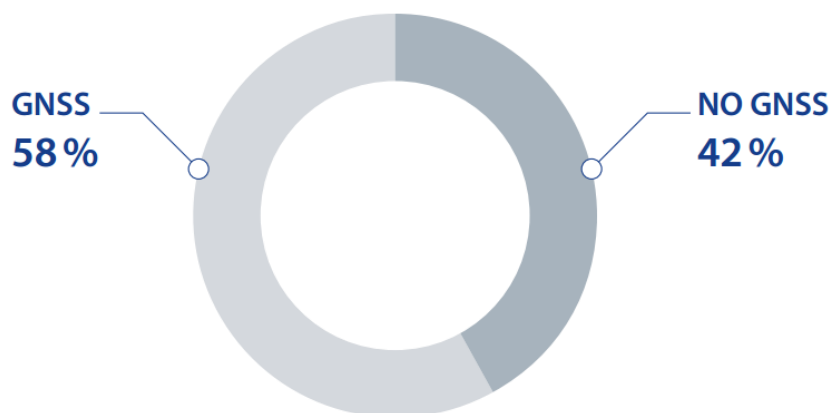
Dynamically influence traffic behavior

## LOW TRANSACTION COSTS

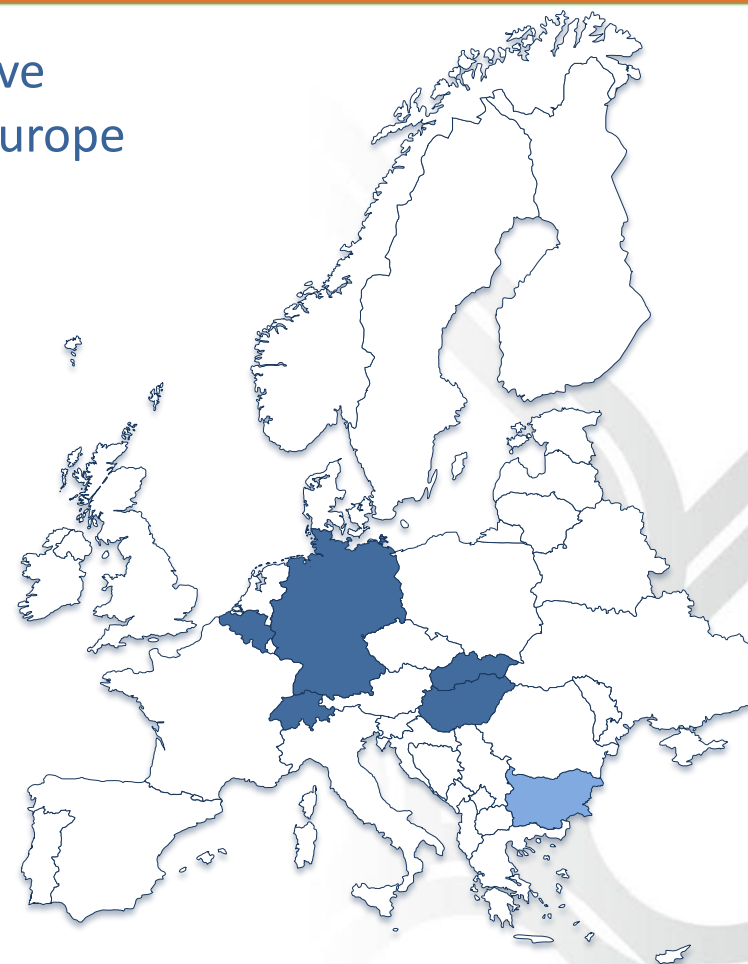
Data traffic costs already @ approx. 2€/month

# GNSS RUC for Heavy Goods Vehicles now

- The advantages of using GNSS for tolling HGV have already been demonstrated and understood in Europe
- GNSS-based RUC system for c. 16,000 km in procurement process in **Bulgaria**
- **58% of tolled kilometres (i.e. 43,000)** correspond to a GNSS scheme\*



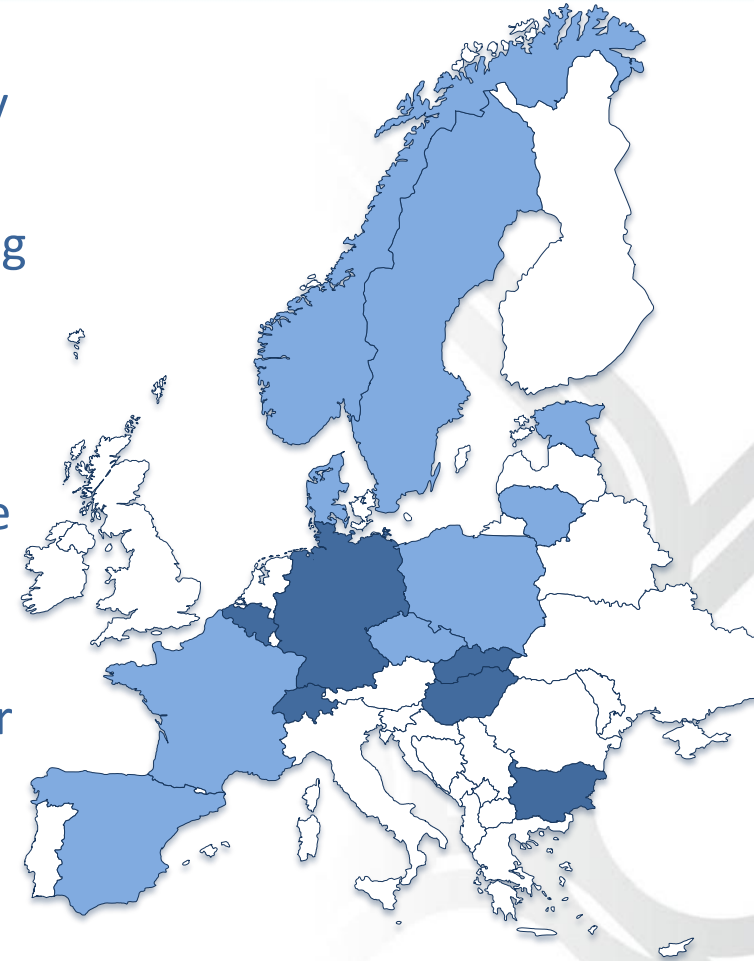
*\*from April 2016, excluding e-Vignette and analysing only EETS-compliant EU28 countries*



- GNSS (also in conjunction with other technologies)
- GNSS planned (currently under development)

## ... and in the mid-term

- **Czech Republic** → GNSS technology under study for the upgrade of the current HGV system
- **Denmark** → trials with GNSS technology ongoing in the Greater Copenhagen Area
- **Sweden** → extensive road network with a small share of motorways and expressways and good quality of secondary roads: GNSS looks to be the most suitable solution
- **Spain** → Studies currently ongoing on a GNSS-based road taxation on both highways and lower class roads



- GNSS (also in conjunction with other technologies)
- GNSS possible (currently under evaluation)

# *The Spanish case:*

## Key elements

- **Vast high capacity road network** mostly under National or Regional control, of which considered for the analysis:
  - 11,676 km → highways and motorways (71%);
  - 1,633 km → dual carriageways (10%); and
  - 3,146 km → first class parallel roads (19%)
- Situation similar to that faced in Germany a decade ago → **GNSS proved extremely successful**, exceeding the initial assumptions on efficiency
- **Retro compatible** with currently tolled network (3,404 km) → combined OBU (GNSS/ DSRC) delivered by multiple service providers
- **Multiple service providers** → high competition and possibility of innovative value-added services mean better and more competitive services for users

# The Spanish case: Analysed variables and scenarios

<b>MONETARY BENEFITS</b>	Revenues from tolling schemes Revenues from OBU rental/ selling and tolling service fee Revenues generated by VAS
<b>SOCIAL BENEFITS</b>	Travel time reduction Fuel consumption reduction Climate change (CO2 emissions reduction) Car accidents reduction Dangerous goods tracking and fleet management savings
<b>CAPEX</b>	Roadside equipment investment OBU equipment cost OBU supply cost OBU replacement cost Core infrastructure & multi service gateway systems and applications cost Start-up user support cost Mobile enforcement equipment cost Mobile enforcement replacement cost
<b>OPEX</b>	Roadside equipment maintenance cost Frauds and incorrect tolling cost Core infrastructure operation and maintenance cost Data traffic cost OBU to infrastructure data traffic cost OBU maintenance cost Selling, general and administrative cost Mobile enforcement cost



**Scenario 1:**  
**Mandatory OBU for**  
**HGV only**



**Scenario 2:**  
**Mandatory OBU for**  
**HGV and PC/LV**

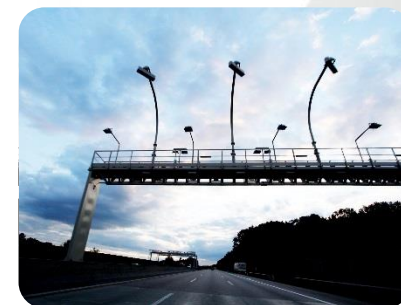
# The Spanish case:

## Scenario 1: Mandatory OBU for HGV

*Key investments, first 3 years (values in €m)*

<b>GNSS</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Roadside equipment investment	-99	-	-
OBU equipment cost	-98	-15	-15
Core infrastructure	-64	-	-
Start-up user support cost	-2	-	-
Mobile enforcement equipment cost	-30	-	-
<b>TOTAL</b>	<b>-293</b>	<b>-15</b>	<b>-15</b>

<b>DSRC</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Roadside equipment investment	-402	-402	-
OBU equipment cost	-6	-1	-1
Core infrastructure	-64	-	-
Start-up user support cost	-2	-	-
Mobile enforcement equipment cost	-15	-15	-
<b>TOTAL</b>	<b>-489</b>	<b>-418</b>	<b>-1</b>



# The Spanish case: Results for GNSS



## CAPEX & OPEX (15 yy)

Lower by c. 55.1% and  
by 32.6%

## Cash Flow (15 yy)

Higher by 9% (no VAS)  
and by 10% (VAS)

### SCENARIO 1

## Full network taxation

GNSS: 2<sup>nd</sup> year  
DSRC: 3<sup>rd</sup> year

## Higher public benefits

By 51% (no VAS)  
By 55.6% (with VAS)



## CAPEX & OPEX (15 yy)

Higher by c. 38.9% and  
by 31.5%

## Cash Flow (15 yy)

Higher by 4.3% (no VAS)  
and by 6.2% (VAS)

### SCENARIO 2

## Full network taxation

GNSS: 2<sup>nd</sup> year  
DSRC: 3<sup>rd</sup> year

## Higher public benefits

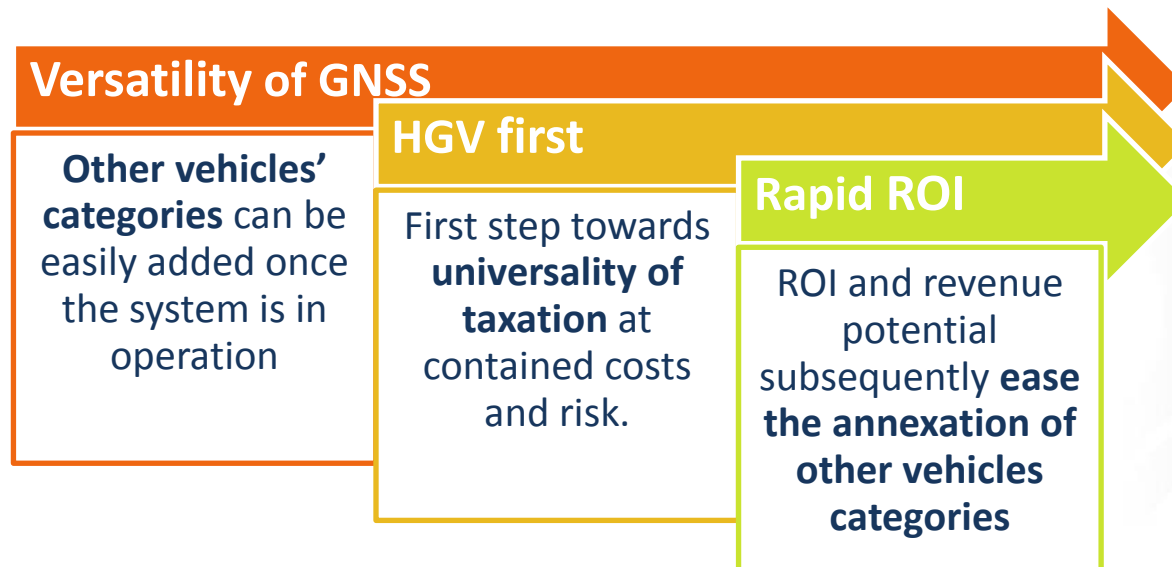
By 52% (no VAS)  
By 53,4% (with VAS)





# The Spanish case: Conclusions

- 3,000 gantries → DSRC **impractical** and with very **costly** maintenance
- **Very rapid deployment only possible through GNSS** → the most attractive solution in terms of the monetary and social benefits and the sustainability of the system in the long term
- **Step-wise implementation is recommended:**



# **GNSS** ADOPTION FOR ROAD USER CHARGING IN EUROPE

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**2015**



European  
**G**lobal Navigation  
**S**atellite Systems  
**A**gency