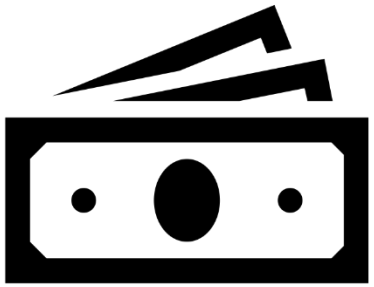
# RUC 2.0 – A Road User Charging Solution with Flexibility and Privacy at the Core

Ane Dalsnes Storsaeter, Vice President Products and R&D, Q-Free

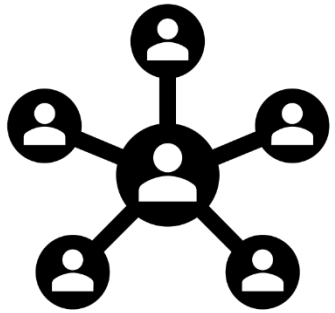
# Traditional Tolling Services

**2 main purposes:**

Finance road infrastructure



Impact traffic and user behavior



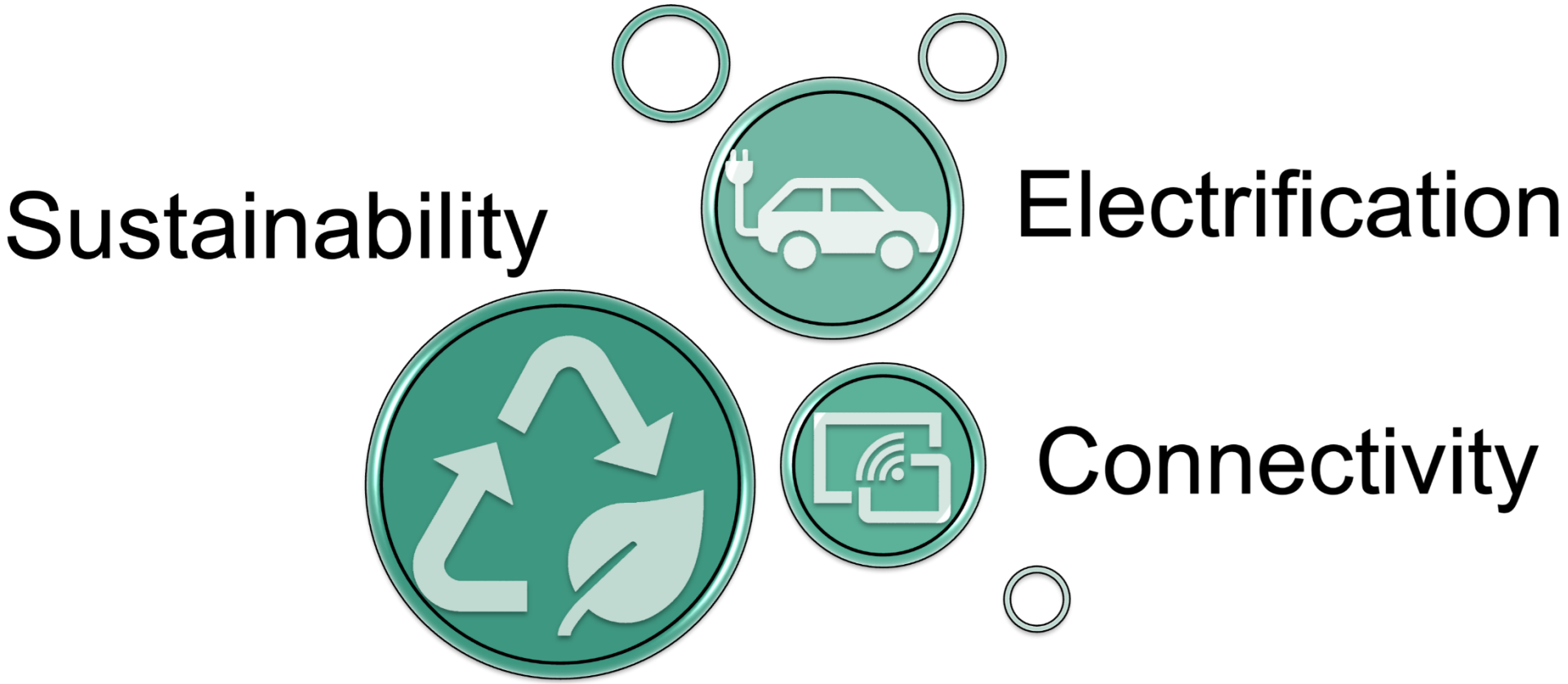
**Benefits of existing toll tag implementation:**

- Established technology
- Existing infrastructure
- Robust and secure solutions

**Challenges with existing implementation:**

- Physical infrastructure investments
- Limited flexibiltiy of services
- Does not scale easily

# Societal changes and impacts for tolling



# Road User Charging – flexible charging systems

- Flexible – pay for usage, e.g., distance-based, time-based, based on wear or pollution.
- Higher resolution data
- Dynamic – easy to change
- More scalable
- Privacy


# Road User Charging 2.0

- Unit mounted on wind screen with GNSS, ITS-G5 radio and low-energy Bluetooth for communication and positioning
- Processing unit with LTE, Wi-Fi, Bluetooth, CAN-bus and secure storage.
- Full hybrid communication platform based on open ISO and ETSI standards.
- Supports V2X 5.9 GHz protocols and message sets from ETSI, ISO og IEEE (including security)
- Flexible design, both in software and hardware


# Privacy at the core

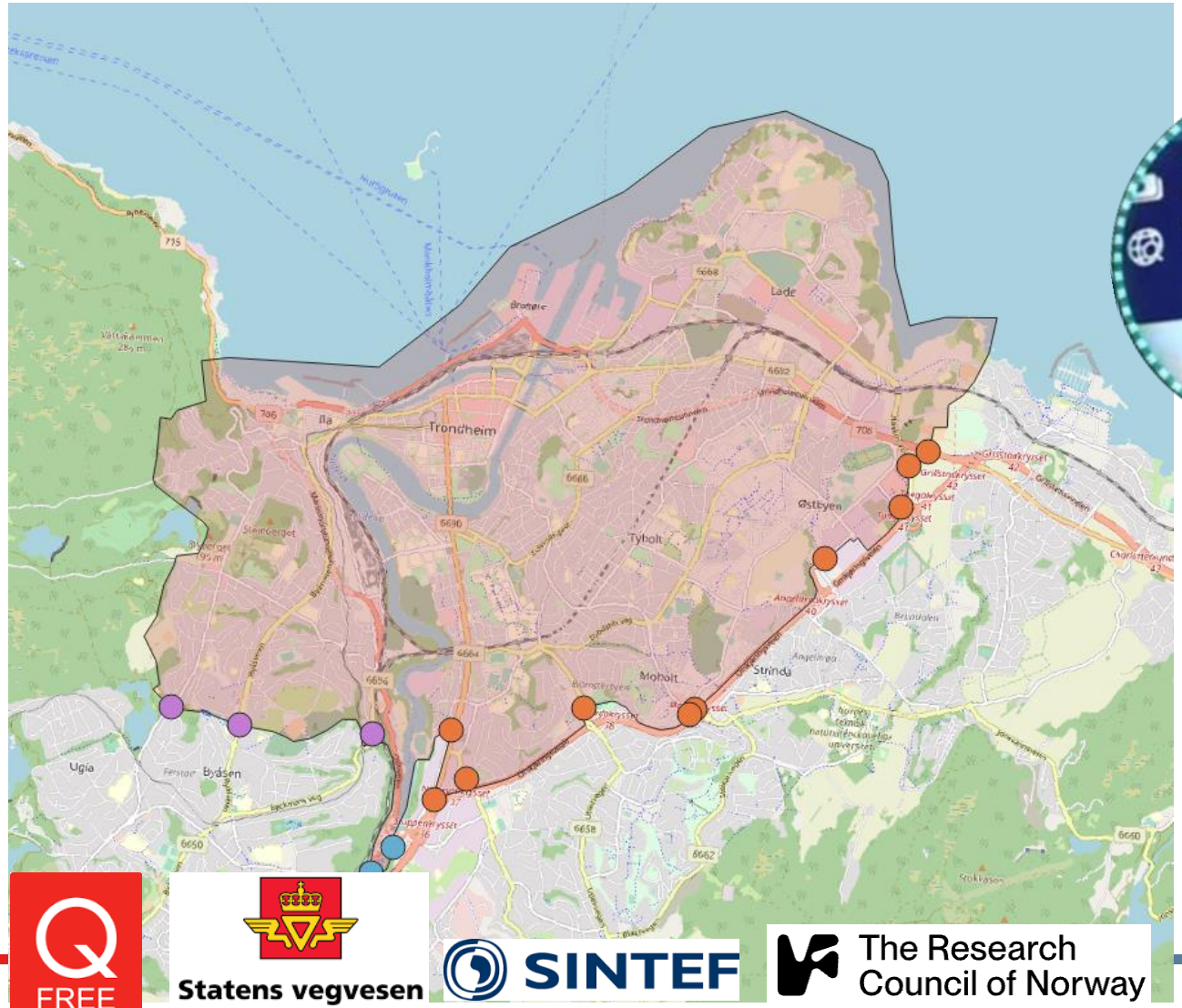
- Thick client
- State of the art security
- No secondary use of collected data
- Secure communication with roadside equipment for verification and enforcement over C-ITS

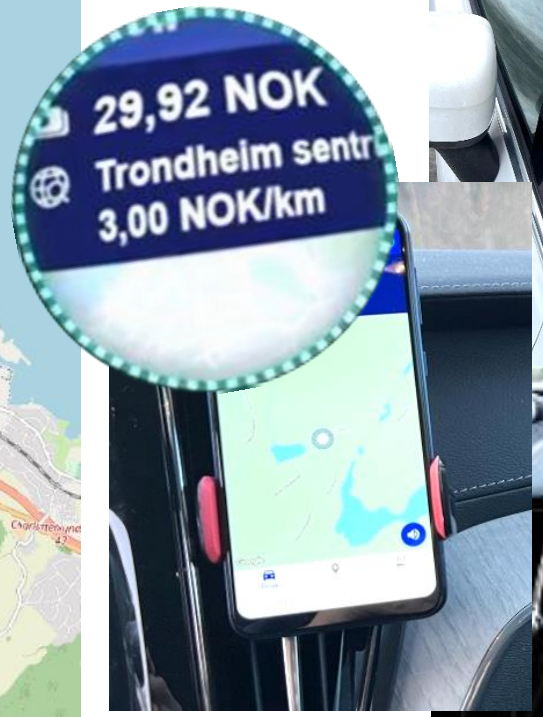

# User interaction
# Possible but not mandatory

Users can connect to the system with a smartphone to:

- Monitor fees
- Plan future trips
- Verify invoice details
- The system continues to calculate fees independent of the smartphone

# Pilot project in Norway

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Statens vegvesen
Norwegian Public Roads Administration

SINTEF

The Research Council of Norway

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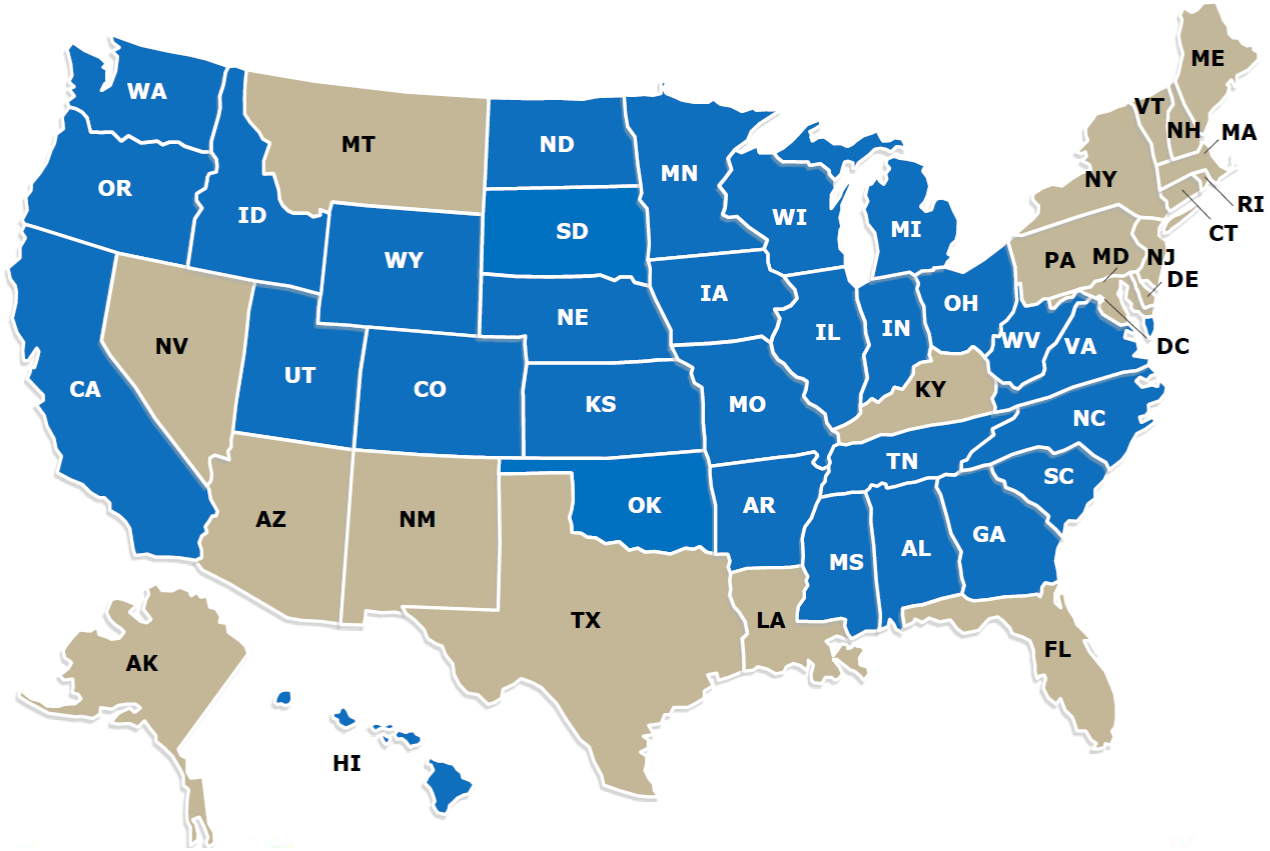
# Road User Charging 2.0

The RUC 2.0 system is based on Cooperative ITS standards and has an open platform architecture facilitating additional services.

| Fee collection | Traffic information | Traffic management |
| --- | --- | --- |
| • Zero emission zones<br>• Studded tires<br>• Parking | • Road works<br>• Travel times<br>• Delays | • Flow optimization<br>• Access control<br>• Freight management<br>• SPAT/MAP |

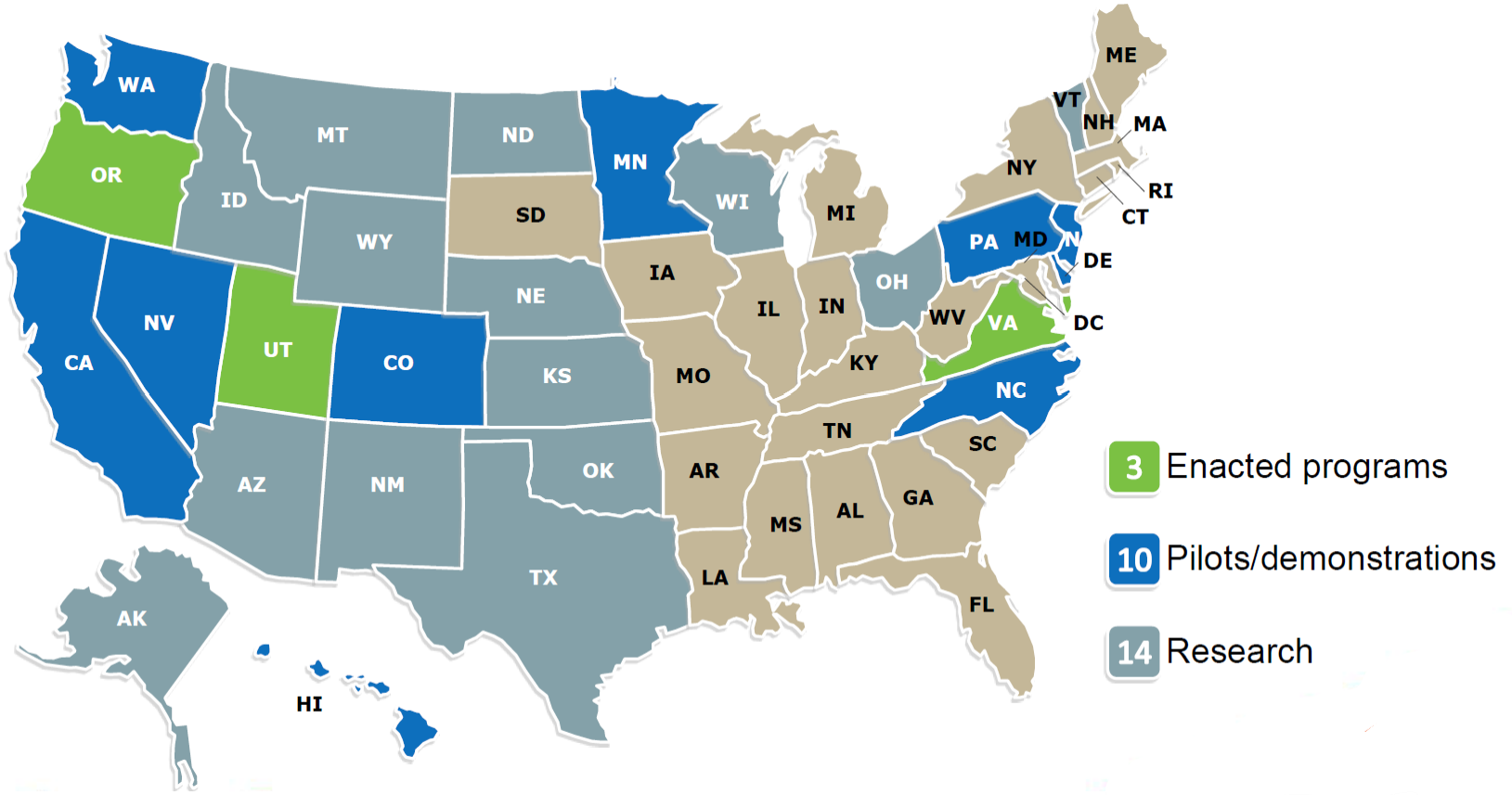
# RUC in USA

# 30 states has imposed flat yearly fees on EVs




Range from US$50 to US$300 per annum

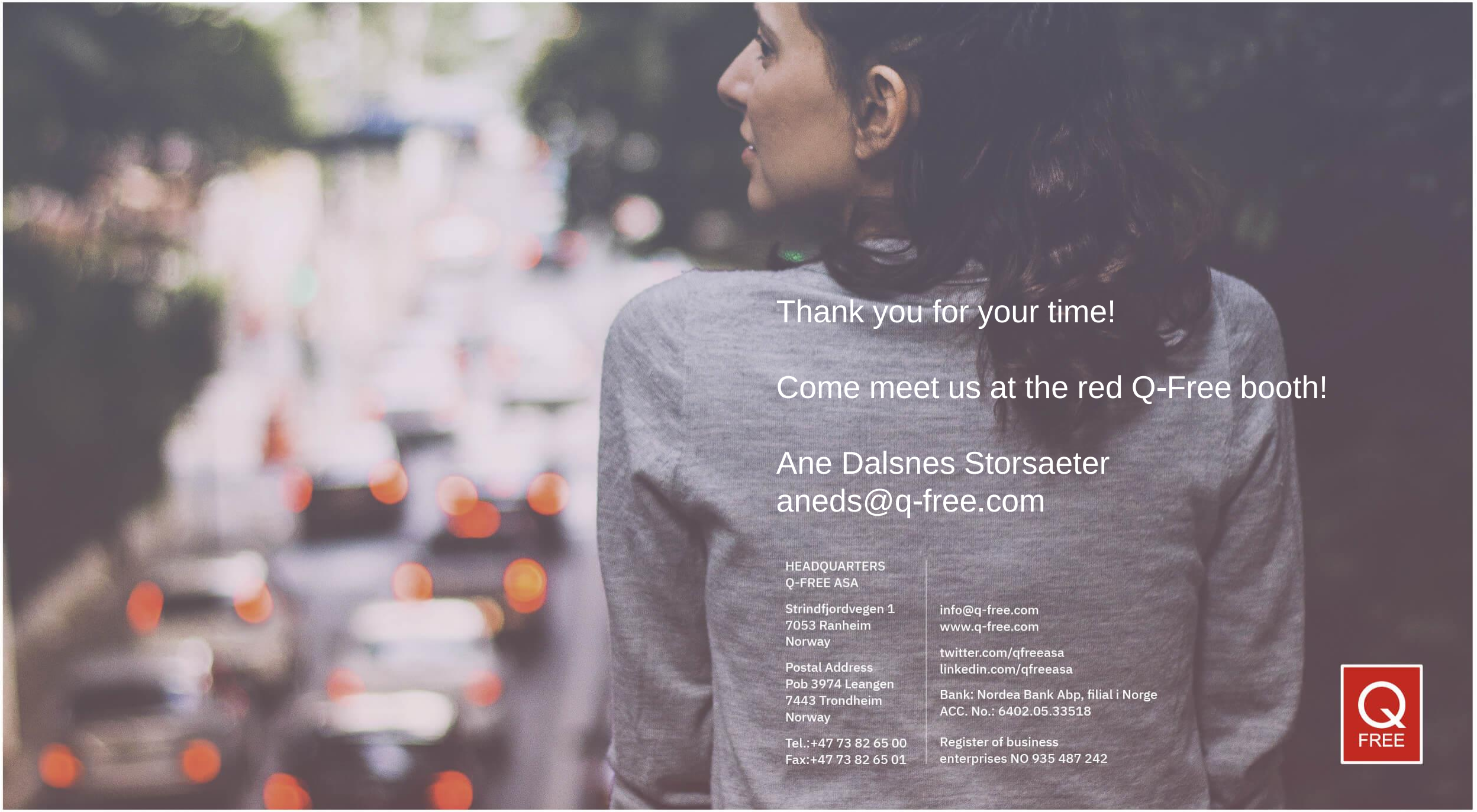
# US states working on RUC for light vehicles



# C-ITS in USA – CV – Connected Vehicles

- Large pilots have been performed: Wyoming, Florida, New York.
- Technology change: ETSI G5 (in US called WAVE) is being swapped out in favor of C-V2X.
- The industry is confused about this and it is still not clear how it will end


IEEE 802.11p – WAVE – DSRC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Ane Dalsnes Storsaeter
aneds@q-free.com
HEADQUARTERS
Q-FREE ASA
Strindfjordvegen 1
7053 Ranheim
Norway
Postal Address
Pob 3974 Leangen
7443 Trondheim
Norway
Tel.:+47 73 82 65 00
Fax:+47 73 82 65 01
info@q-free.com
www.q-free.com
twitter.com/qfreeasa
linkedin.com/qfreeasa
Bank: Nordea Bank Abp, filial i Norge
ACC. No.: 6402.05.33518
Register of business
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