Road Pricing: HVF in Switzerland

LSVA

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■ Recording Tools
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■ Implementation
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Heavy Vehicles on North-South Transit Route
Impact of Bilateral Agreements EU-CH

Increase of Weight Limit
28 t ➔ 34 t

Change from flat HVF to distance related LSVA

HGV traffic
01.01.2001

HGV traffic
01.01.2001

Monitoring
LSVA Objectives and Principles

■ Objectives:
 ➤ True costs
   – Internalisation of external costs
 ➤ Demand management
   – Protection of the Alpine Region
   – Limit the expected traffic increase when the national weight limit rises from 28t to 40t
   – Modal shift of Alpine crossing goods transport from road to rail
 ➤ Financing rail infrastructure
   – New transalpine railway tunnels

■ Basic principles
 ➤ Driving more means paying more
 ➤ Empty vehicle costs as much as fully loaded one
 ➤ Replaces the previous flat HVF
LSVA: a Distance-related Heavy Vehicle Fee

- Introduced on: 1st January 2001
- Subject: Heavy Vehicles above 3.5 tons
- Infrastructure: All public roads
- Tariffication: per Kilometre and per Ton, Emission-dependent
- Operator: Swiss Customs
LSVA System Size

12,000 entries per day

100 equipped border stations

55,000 domestic vehicles

12,000 exits per day
Key Technical Challenges of LSVA

- Recording of distance
- Recognition of border crossings
- Declaration of trailer weight

Tariff depending on emission
Kilometres travelled in Switzerland
Weight of vehicle plus trailer
# LSVA Recording Tools

<table>
<thead>
<tr>
<th>Domestic vehicles</th>
<th>Foreign vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandatory equipped with:</td>
<td>Voluntarily equipped with:</td>
</tr>
<tr>
<td>On Board Unit</td>
<td>On Board Unit</td>
</tr>
<tr>
<td>In approved exceptional cases:</td>
<td>In principle using:</td>
</tr>
<tr>
<td>Log-Book &amp; TAG</td>
<td>ID-Card &amp; Self-service Machine</td>
</tr>
</tbody>
</table>
TRIPON On-board Unit: Technically Complex

- **External Power**
- **Internal Battery**
  - Graphic Display Status LEDs
  - Keyboard
  - Acoustic Signal
  - External LEDs
- **Main Processor & Memory**
  - LP Processor & Clock
- **DSRC**
- **GPS**
- **Tachograph**
  - Chipcard reader
  - Movement Sensor
  - Trailer Sensor
  - Detector of Physical Fixing
- **Interface for Programming and Data Readout**
55 000 equipped Vehicles
On-board Unit “TRIPON”

- Chipcard Reader
- DSRC and GPS antenna
- Keyboard
- Display
- Tachograph
Data Recording

The on-board unit records all events in a logfile

<table>
<thead>
<tr>
<th>EVENT</th>
<th>Event Detail</th>
<th>Km-Reading</th>
<th>Date &amp; Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATUS</td>
<td>Status Bits</td>
<td>139 542.4</td>
<td>1 Oct. 2001, 6:00</td>
</tr>
<tr>
<td>STATUS</td>
<td>Status Bits</td>
<td>139 723.7</td>
<td>2 Oct. 2001, 5:03</td>
</tr>
<tr>
<td>TRAILER ON</td>
<td>8.5 tons</td>
<td>140 012.5</td>
<td>2 Oct. 2001, 16:28</td>
</tr>
<tr>
<td>EXIT via DSRC</td>
<td>Border #018</td>
<td>140 121.7</td>
<td>2 Oct. 2001, 21:12</td>
</tr>
<tr>
<td>ENTRY via DSRC</td>
<td>Border #021</td>
<td>142 252.3</td>
<td>5 Oct. 2001, 08:23</td>
</tr>
<tr>
<td>TRAILER OFF</td>
<td>8.5 tons</td>
<td>142 263.4</td>
<td>5 Oct. 2001, 08:43</td>
</tr>
<tr>
<td>STATUS</td>
<td>Status Bits</td>
<td>142 278.7</td>
<td>6 Oct. 2001, 5:23</td>
</tr>
<tr>
<td>DEKLARATION</td>
<td>Status Bits</td>
<td>142 278.7</td>
<td>6 Oct. 2001, 5:23</td>
</tr>
</tbody>
</table>
Data Readout
Billing Procedure

- Monthly read-out of the trip data
- Declare (=send) the data to the billing centre
- The billing centre invoices the owner
Border Crossings Recorded with DSRC

- 5.8 GHz DSRC technology according to European Standards (CEN TC278)
- Swiss vehicles: Switch from “km counting on” to “km counting off”
- Foreign vehicles: Read out of accumulated logfile data
Recording of Trailers: Self-Declaration
Equipped Vehicles: Experiences

- No major problems
  - Very smooth introduction phase
  - Low traffic in January helped a lot
- Technical equipment works flawlessly
- The LSVA procedures are accepted
  - Drivers understand the man-machine interface
  - Hauliers accept the fee collection instruments
  - Transparency of the data collection is important
  - “High-Tech” on-board unit is prestigious
- Initial delays in invoicing
  - Quality of registration data was partially low
  - Increase in national weight initially caused a very high mutation rate
Fixed Enforcement Stations

- Vehicle detection and classification
- DSRC communication
- Digital video enforcement with automatic license plate recognition
Procedure for Foreign Vehicles without OBU

FIRST ENTRY INTO SWITZERLAND:
- registration of vehicle data
- ID-Card is issued

ON ENTRY
Self-service machine:
- identification with ID-Card
- declaration of kilometre reading
  and trailer status
- choice of payment means
- receipt with declaration

ON EXIT (without leaving vehicle)
- declaration of kilometre reading
- signature
- random check of declaration
Self-Service Terminal: Experiences

- Solution is proven
  - Drivers understand the user interface (26 languages)
  - The concept of a simple menu structure is proven
  - Feeling of accomplishment to master the self-service machine

- High traffic volume can be managed
  - Queuing not due to LSVA

- Foreign vehicles: Low share of cash payment
  - 65% Commercial credit cards (petrol cards: DKV, UTA, Esso, ...)
  - 20% Cash
  - 10% LSVA account
  - 5% OBU transaction (about 1 500 vehicles)
Project Phases

1997   Pre-Analysis
Dec. 1997 Adoption of the law by both chambers of parliament
1998   Conceptual design
Sept. 1998 Positive vote after referendum
1999   Detailed planning, calls for tenders
2000   Production of OBU, installation, training
1.1.2001 Start of fee collection
Installation and Maintenance Costs

■ On Board Unit
  Procurement cost 800 EURO / unit
  (OBU issued at no cost to HGV owners)
  Installation approx. 200 EURO / unit

■ Investments of Swiss Government
  Road side equipment and background system 100 Mio. EURO
  Cost of OBUs 60 Mio. EURO
  Operational costs (yearly) 16 Mio. EURO

■ Personnel requirements 120 staff

■ Total collection costs 4 - 6 % of revenue
Short Term Impacts of LSVA

■ Fleet Adaptation
  ➤ Replacement of high-emission trucks
  ➤ More specialised vehicles (e.g. lighter trucks for light goods)

■ Organisational Changes
  ➤ Mergers / co-operation in trucking industry
  ➤ Freight and Fleet Management

■ Route Choice
  ➤ Little change in routes; no detour traffic
  ➤ Some indication for modal shift (combined transport)

■ Effect on Prices
  ➤ LSVA used to justify transport price increase
  ➤ Little influence on consumer prices
Fears did not come true

Expected effect:
- Change of fleets towards Light Commercial Vehicles < 3.5t
- See advertisement “100% truck 0% LSVA”

Important argument against LSVA

Reality?
- No significant changes
- Big fleet renewal on HGV
Sales Statistics for Commercial Vehicles

- **Light Commercial Vehicles:** No observable effect

- **Heavy Vehicles:** Migration towards “optimal size”
Long Vehicles at Automatic Counting Stations

- Decrease in 2001 both on motorways and on normal roads
LSVA works!

- A completely new type of fee collection system
- Attractive EFC system with low investment and operational costs
- Very good balance between costs and returns
- Major progress towards fair and efficient road pricing
Conclusions for City Access Fees

- Demand management through pricing measures can work
  - LSVA is comparatively high, but effects are still small
- Impacts are not fully predictable
  - Market will adapt to pressure, but many reactions are possible
- Processes come before technology
  - Technological solution has to follow the problem, not vice-versa
  - From the experiences of LSVA no technical recommendations can be given
- Processes for the occasional user are decisive
  - The procedures for the non-equipped, badly informed user decide whether a system works.