Swedish Biogas Approach for a Greener Transport Sector



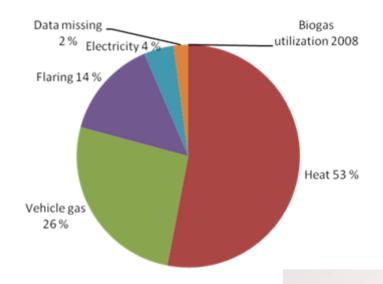


The Swedish biogas situation (2008)

Type of plant	Number	Production (TWh/year)
Municipal sewage treatment plants	140	0.605
Landfills	58	0.369
Co-digestion plants	17	0.240
Farm plants	8	0.015
Industrial wastewater treatment plants	4	0.130
Sum	227	1.359



Utilization of biogas in Sweden (2008)





Factors affecting the market I

- Taxes
 - Energy tax
 - Carbon dioxide tax
 - Carbon dioxide differentiated vehicle tax
 - Reduced fringe benefits tax for cars
- Market-based mechanisms
 - Carbon emission trading
 - Electricity certificates



Factors affecting the market II

Support systems

Investement grants (100 million SEK)

LIP KLIMP

Support for filling stations

Investment grant within agriculture (300

million SEK)

Green car premium

Discount on vehicle tax

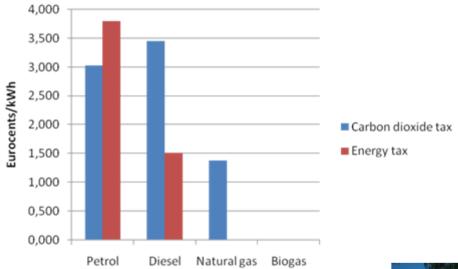
Free parking and local support

Regulations

Law about renewable fuel at filling stations



Taxes for fuels





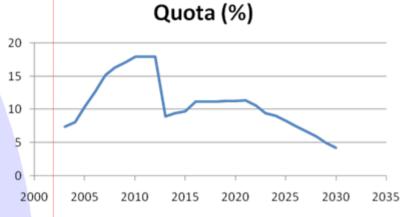


The elcerticity certificate system I

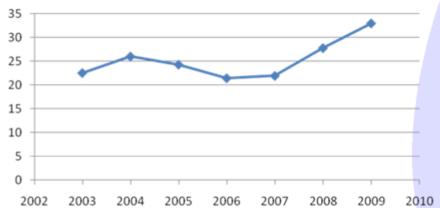
- Introduced in 2003, ending 2030
- Based on quota obligation
- For each MWh of produced electricity from renewable sources one certificate is given
- The producers sell electricity and certificates
- The quota for 2010 is 17,9 %



The elcerticity certificate system II



Average price (Euros/MWh)







Biogas strategy

- Presented 31st of August 2010
- Some conclusions:
 - Biogas from waste gives unique benefits
 - Biogas from manure gives large environmental benefits; manure bonus
 - The potential is 3-4 TWh annually
 - Continued research and development;
 gasification



Manure bonus

- Suggested in the Biogas Strategy
- 0,20 kr /kWh produced energy from manure = 2 Eurocents/kWh
- Is given due to avoidance of methane emissions from manure
- Not decided yet





Report from Energy Markets Inspectorate in 2009

Conclusions

Biogas production is not profitable enough

The markets for both biogas and natural gas are too fragmented

The infrastructure is limiting

Suggested solutions:

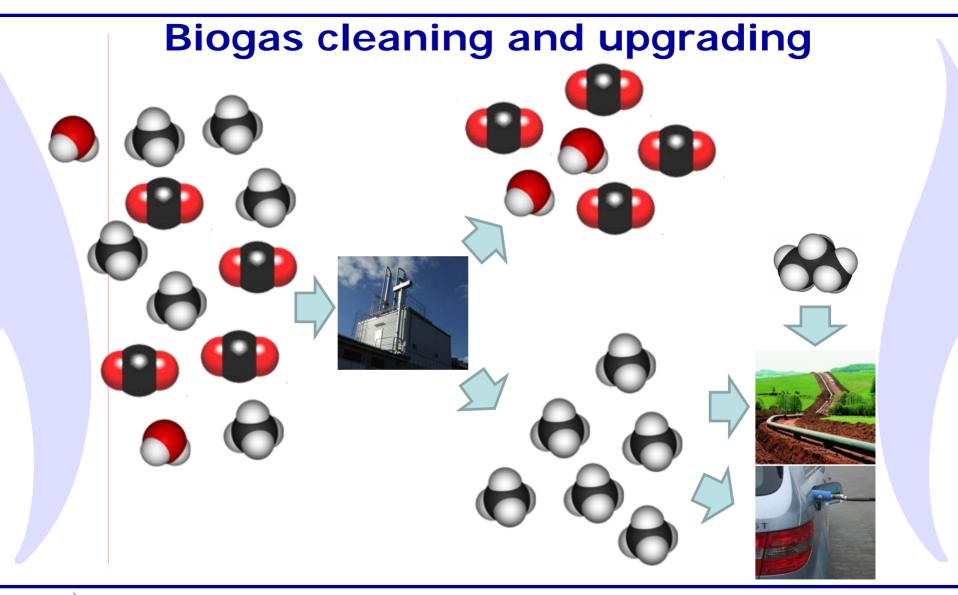
Labelling of biogas

Upgrading cost should be covered by the grid owner

Build new infrastructure









Swedish experience of biogas upgrading

Gastordon

Nytt projekt i Linköping:

Bioaas kan konkurrera

Treed dieselprised

Den slutsation drar att ha studeout preliminära kalyler haverade på filevidstritning av restprodukter från jordbruket. Avsikten är att, om utvärderingen av fürvökorütningen ger ett positivt resaltat, byggs on biogreanliggsing, sum bland annat skall leverera brisede till ett antal biogadussar i

Gasbussarnas hannel star sub takes must discribe

though per the Maper Disease

Marketik, aus skit Nordisk i moharepe physical adjusting and a second of the last come I Transferint Marrenti har van ni an gwaadhina ba' Deangniga bigit, tead

- Yack, vote Marietak sich Ferder Leidenspromient VIII in Nordon best i sample-grater rating till him wildysale Main d'Erstand note builde i praire make advised this burn belowed release

No giller det on pe nemdigherers not set that on thing bomponers and the last of a Research

Tekniska Verken i Linkisping efter mates LEFA, Nazak, Statusi turcejunctei

school-net homottenable till problet But his an economistingering control or nor heldersides. Metadology risper from art. To promise talk to promise to a see \$4.000 few

Barrages hashes married appropriate to some Not reduced to full so that mines per-

Inga stora bekymmer

Recommend in market in a restricted from untdoories, since LECA's unrechtingsaled. Tomas Andline: Resistent für bingerit. bea. Visal hardel turk or del problem, men Analysis of games a lattice of the

10st har read bounded one performed I freezen now shat tilly high remover moved him on second high death. Man fittering back our

Molecules for approximate i in the depice, culture since from Kaliford, Dei Notyder att den mittigliederson no le caramatore passares de dicractivamenta.

Slat vid halvärvskiftet

Ownshipme, Lobriging Traffic Alle forth torgodiesur i regular toda. Det in ett

blick mod gartimur fibbles scaled till nal halt brook from more LTCA beauting the displication because a sides. Scotter till Southerin car stractic. No:

Vi savoknie bedatos em hamblen in nan ni vidtar adano lispindyr, etgor Tomas Kullinger, Adli Kingget pii, Talentaka Verberto district most extension or shall contain soft and a resignmental and it is propositivelect. Biomerphical sale progradulated time

iogas!

state of the other state specialization between produktion is motion. Biogracia kan produ the fee of our composition efter

the planneds nowing beans or flere

- schools rentprodukter inte sinks.
- · Cartahogosis tir decibation or No to a cit had being a service before
- * Transporter till och fran Negoundage
- . Record by speaking or more grid.
- Tasksingstales behave.

So stomed shall opinion up and however till elts de melicade deltorac transport-forme na. pracosteletti, positiyac, peditake broken, colleges both choscopic selb total

Repodlade roller

heta trivalin, signt Tomo Kalbur, Vi

off him briggly finder i frontain u.b. Linkinger himschauer fammer man terkeringsmuch skall finner picture on-

Toma Kalling my at day physiolic few and retrievaluely protect.

Out in done durant has been did not show. realism or thrown it. Bingmost bulkings in in this decrease in allowed such all knowns are at Makes. Nile on morthmad life confluence where

Bull Adamson

Gastordon

Cummins.

Calumbia, fractions, in technica does all medical bire in brought along science \$400.

Naturgasdrivna

from most deep board on Microsophia become all his on nationalized solice pic felt

1996-97 ach pe don rokeur Mounky Policient in national entire six salt of machine nitros proteiros. He idente so-

Naturgasen

oles relata in pri froulk kies med to

William In our Printer Training of the radio responsario spiliatra cetatrica: Abrices Not much tarbo out total-littleton Undapped him property in behalter



Gasvarning

Britinbara gaser – giltiga gaser

Stationart - portabelt

BOO INSTRUMENT AB

int shekterdall. Friendlaw british forum good

air popolici fae fooksoore and dine!

salities stood himson-bancowers.

Götchoog Tir 032-4902-00 Fax 031 49:56-27

Stockholm Trl 06 747 22 50 Fax 06 747 16 45



Biogas upgrading in Sweden

- In Sweden today:
 - Water scrubber (30)
 - PSA (8)
 - Chemical absorption (6)
- In the near future:
 - Cryogenic





The Swedish gas grid

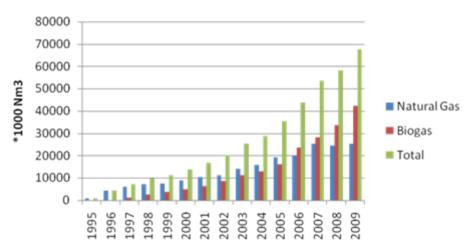


Source: Swedish Gas Association



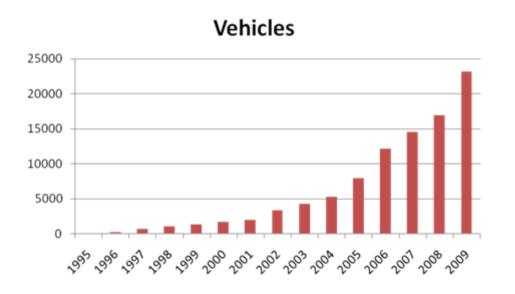
Biogas in the Swedish transport sector I



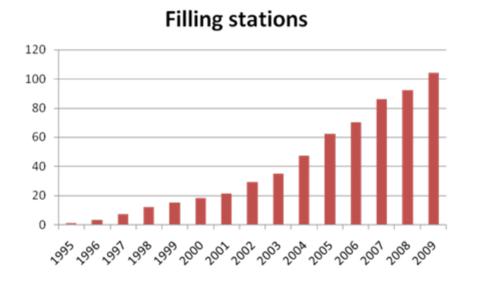




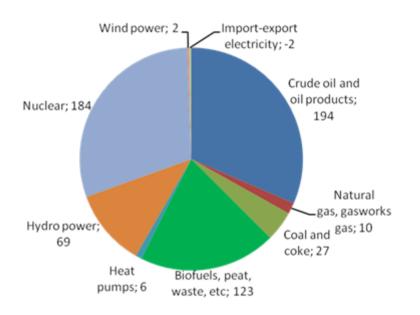
Biogas in the Swedish transport sector II



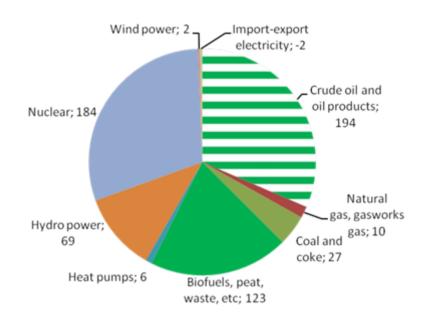
Biogas in the Swedish transport sector III



Energy supplied to Sweden 2008 (TWh)

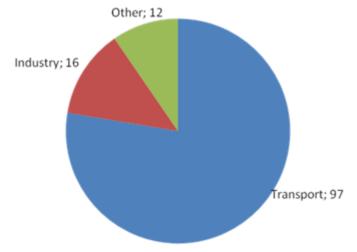


The main challange...



Oil products

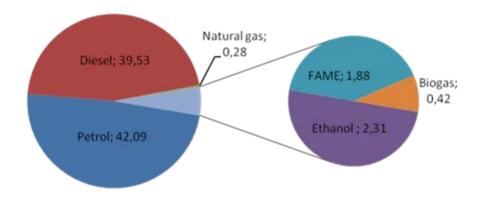
Utilization of oil products in Sweden 2008:
 125 TWh







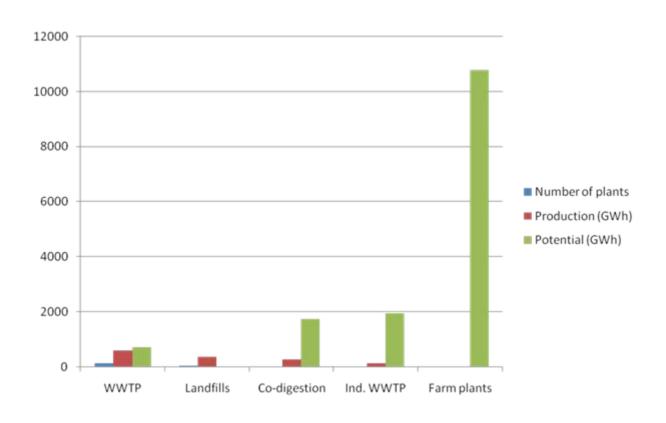
Fuels in the Swedish transport sector (2009)



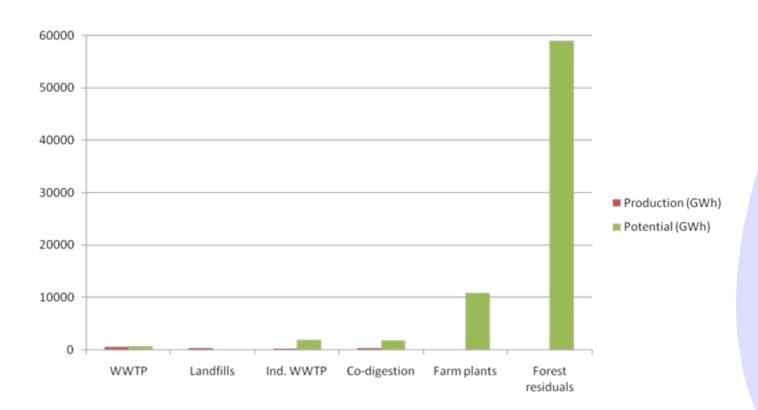
Share of renewable fuels was in 2009: 5.3 %



Potential for Swedish biogas production



Potential for Swedish biomethane production





Thank you for your attention!



www.sgc.se anneli.petersson@sgc.se

