

Light-Electric-Vehicles Global Market Trends And Standardization

International Li-Ion E-Bike Industry Summit

April 13th 2014 Shanghai at China Cycle Show

Hannes Neupert

Agenda:

Short introduction Hannes Neupert

Summary state of the global market

International Standardization key to market growth

Major technology trends



Since 1992 President of
ExtraEnergy.org and Managing Director
ExtraEnergy Services GmbH & Co. KG

Since 2007 Treasurer of the
EnergyBus NGO Since 2013 as well
Managing Director of the
EnergyBus GmbH

Since 2011 on the board of the
BATSO NGO



Member of
IEC/ISO/TC69/JPT61851-3
Member of: IEC SC 23H



Vice chair of DKE/GAK 353.0.9 at the
IEC/ISO/TC69/JPT61851-3
Member of DIN NA 112-06-01 AA N490
on cargo bicycles
Member of DKE/UK 542.4
DC Steckvorrichtungen

Hannes Neupert Industrial designer/Autor

Working since 1982 in the
area of electric vehicles.
Since 1989 mainly in the
field of electric bicycles.



Member of
CLC/TC21X about Battery safety



Operating Agent of the implementing
Agreements >Hybrid & Electric Vehicles< of the International Energy
Agency, Task 23: „Light-Electric-Vehicle Parking And Charging
Infrastructure“



Member of the board of the EU pedelec promotion
Project GoPedelec! Within the EACI Framework:
Intelligent Energy Europe

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Future based on laziness and Image!

Pedelecs are the escalator, the washing machine as well the daily exercise machine - they are becoming to be the iconic image of modern mobility.





Recently I just have taken this picture at a sunny day at the Main river banks in Frankfurt Germany. It shows the young generation featuring their beloved gadget No 1 the smartphone and proudly showing of a Pedelec!



Recently a group of school boys in Napoli Italy was enjoying testrides so much that they almost could not stop riding them.



Mayors do like to be seen with Pedelecs nowadys all the time...



Kanzlers do like to be seen with Pedelecs nowadays as well...

Sporty Pedelecs taking off in Europe!



Family Pedelecs



The Bakfiets: As the name suggests this springs from the baker's delivery bike, and it has become a much-loved family vehicle in the Netherlands. With a pedelec drive it will also spread to hillier parts of the world.

Kindergarten Pedelects



Kindergarten pedelec: For those who need to carry even more children than will fit in a Bakfiets the solution is the *GoCab*. There's plenty of room in the *GoCab* for eight children to be safe and comfortable. It makes the kindergarten run child's play.

Velomobil Pedelects



Ideally suited to the bicycle ›expressways‹ which are ever more widespread in the Netherlands (see page 59), the *Velomobil Versatile* is also available as a pedelec with the *Daum* crank motor, and this ensures that it'll make speedy progress not just on the flat but also uphill.

Cargo Pedelecs

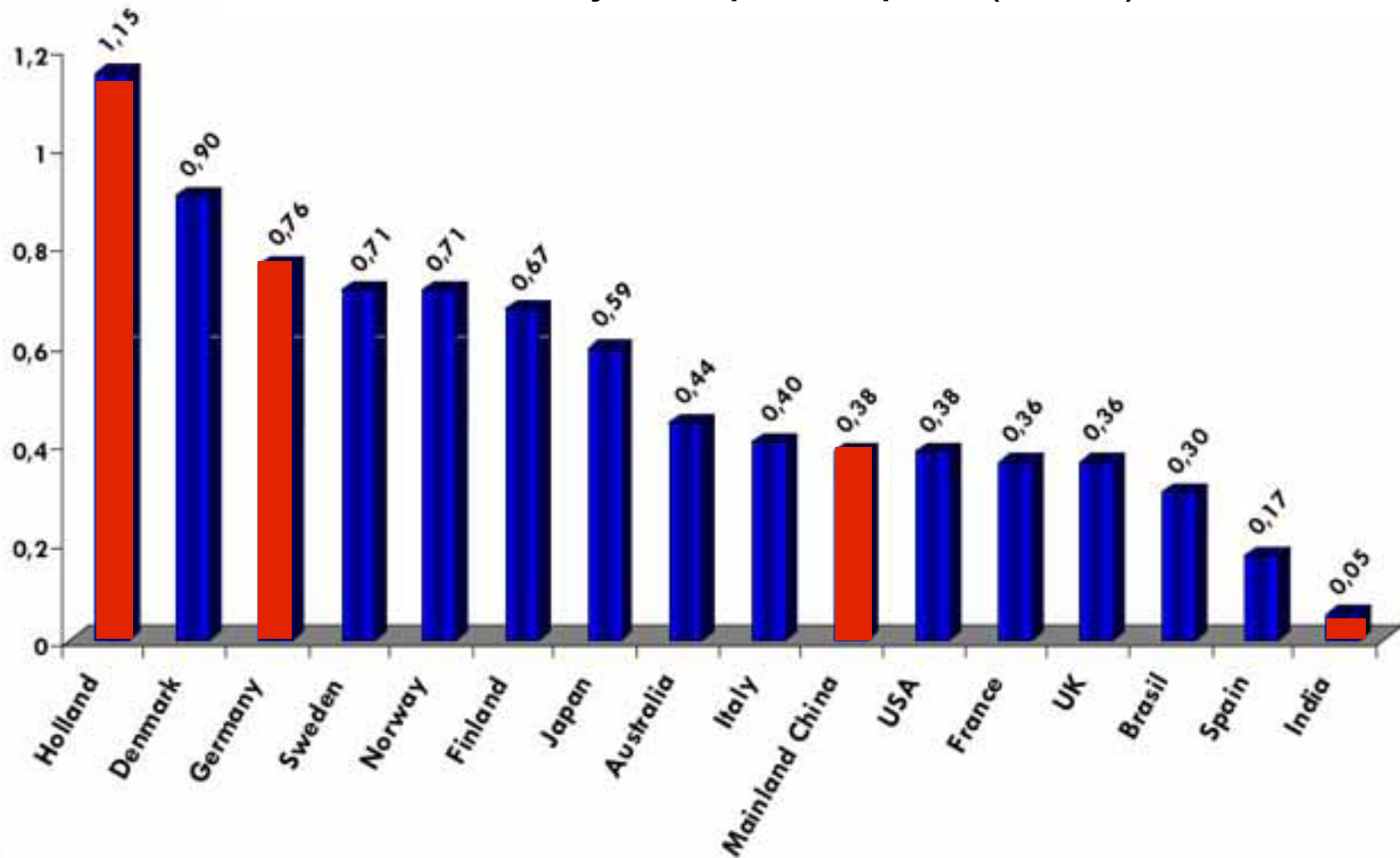


XXL load carrying: the *Vrachfiets* from the company of the same name, from Rotterdam in the Netherlands, is lent out by *IKEA* stores in Holland to customers so they can transport their new furniture home.

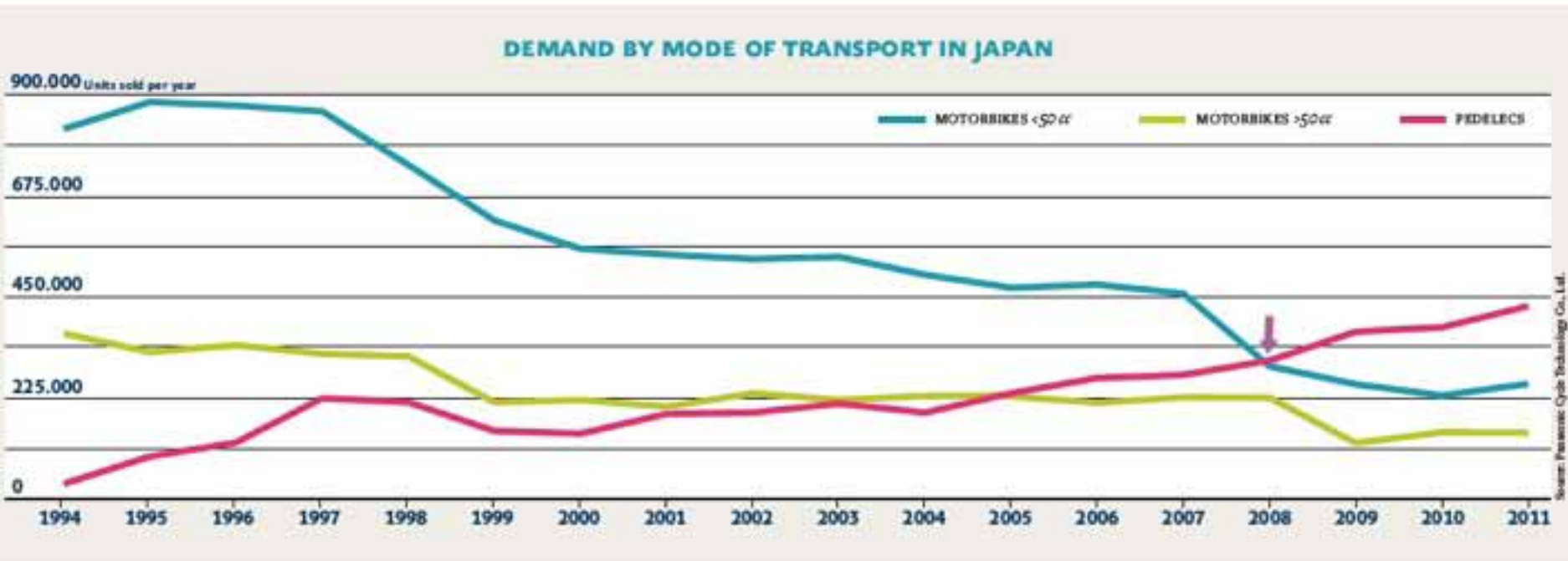
A pedelec does not need to look like a bike - The Netherlands are always a innovative corner for bicycle trends...



Bicycles per capita (2008):



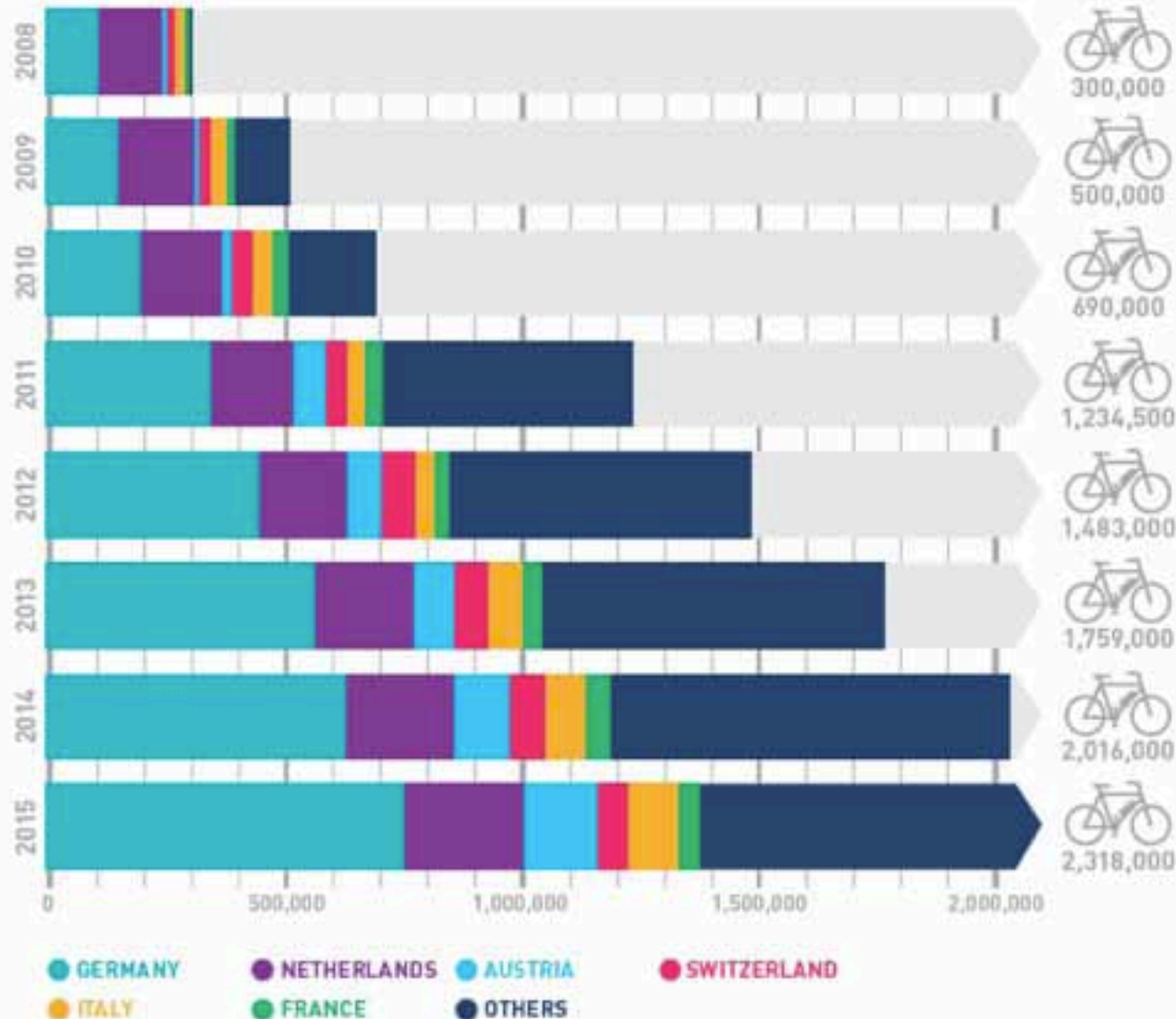
Pedelec Homeland Japan 1994 until 2011:



The Motorcycle lost in the competition with the pedelec!

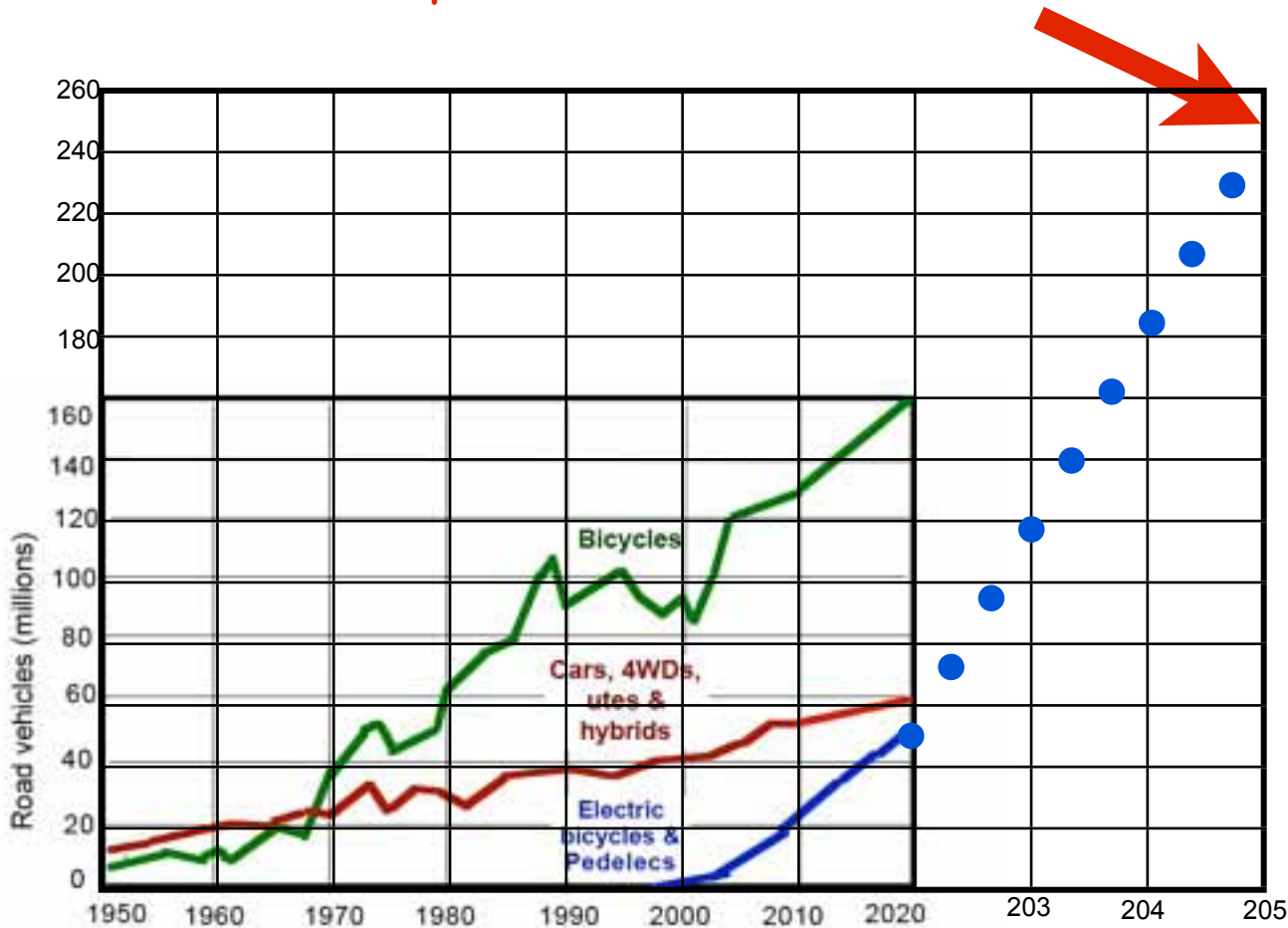
EUROPEAN COUNTRY E-BIKE SALES, 2008-2015*

*2013-2015 ESTIMATED



2050 annual global sales expectation of Pedelecs higher than any other vehicle today: 250 Million annually!

Considering that the average Battery will have at that time conservatively judged 500 Wh this would be an annual sales volume of 125 Million Kw/h battery capacity not taking into account the replacement needs



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Single solution

Treasurer Hanno Neupert discusses EnergyBus and its work in bringing together energy and information in a single connection

EnergyBus is a member organisation that consists of persons, institutions, associations and companies. Everyone who wants to work with and on the EnergyBus standard is free to join. As a member, one will gain access to the EnergyBus protocol, be allowed to use EnergyBus applications and connectors and is entitled to work on the development of more features.

EnergyBus has seen constant growth since 2007. Currently, there are about 60 members. Some of them already apply the EnergyBus communication protocol and connector set; others use still the beta version of the EnergyBus charging connector. Furthermore, members come together in the various technical committees to define and improve the EnergyBus standard. Together with iso and iec committees, the members are dedicated to harmonise interfaces connecting energy and communication. This is enabling more cost-effective innovation and technological progress.

Most members come from the light electric vehicle industry, so they are manufacturers of (electric) bikes, drive systems, applications, batteries, human-machine-interfaces and more. Institutions like EnnioEnergy eV, ibi or Car in Automation and the Fraunhofer Institute are driving forces behind innovations and ideas for the future. These are then often realised in co-operation with members from the industry and development partners like amtra GmbH.

Lately more and more members have joined that offer solutions for infrastructure or are providers of it themselves. They come from the tourism industry with rental schemes for pedelecs or providers like Deutsche Bahn which combines their train network with bikes. For them, a charging infrastructure that uses one single connector, which is not limited to be used in only one kind of vehicle, means freedom and safety for the future.



In 2011 the first EnergyBus connector set will go into use at a trial at the bike station. In March 2012, the first set will be available.



The first joint preparatory meeting by iso and iec members, held on 3rd of December 2011 in Karlsruhe, Germany, was the start for a growing technical information relation with iso. EnergyBus is the project in the future.



The first shared public charging and leasing infrastructure, installed by EnergyBus member ibi in 2011. It allows the charging of each bike station with the EnergyBus connector.

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As Published in the February 2013 Edition of Pan European Networks Government 5 Book



Global Activities on LEV charging infrastructure supported by EnergyBus

iso¹ and iec² Global harmonized standardisation

In a joint effort, the two international standard organisations iso (mechanical) and iec (electrical) are working on harmonised interfaces for electric two wheelers for a unified dc charging connector and communication between the charger and the vehicle and/or battery.

The first meeting was held at the beginning of December 2011 in Shenzhen, China. The only proposal on the table was the EnergyBus connector and the EnergyBus protocol. Reports about the progress are available here: www.energybus.org



IEA HEV IA³ Global political platform supports LEV standardisation

The iec working group represents 17 countries, whose goal is to support on a political and governmental level the spreading of all kind of electrical vehicles, including pedelecs.

A new project is scheduled to be focused on pedelecs as an extension of public transport systems. Especially affordable and robust, public locking and charging infrastructure is the key to making it happen. www.iea.org



European level

The European Union is actively pushing for a unified connector and charging solution to fit all users in the so-called pilot. A single connector type with standardised communication will become mandatory.

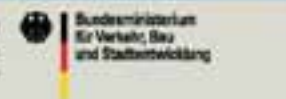
Many details on how infrastructure have been published by the eu in the GoPedelec! handbook which is available for free in German, English, French, Spanish, Czech, Hungarian, Italian, and Dutch.

A free download of the handbook is available in several languages at www.goebike.eu



German national level

The National Bike-to-Go-Plan 2020 (iuvoract) of the German Federal Ministry of Transport, Building and Urban Development, which was agreed upon by the German parliament on 3 September 2012, includes clear self-binding statements on the establishment of public charging infrastructure for cars to be established by 2020. www.bmvbs.de



Industry and private level

The joint pilots project by the German Alps region Tirolersee, Schliersee and the Austria region Achensee teamed up with EnergyBus members. This team has established in 2012 a standard charging infrastructure for pedelecs.

The core idea is a standard charging and locking cable, which is making the mechanical and electrical connection between the pedelec and the bicycle stand. This system will be tested within the pilot region in the summer of 2013.

Further details regarding the companies involved in this project are available here: www.charging-of-infrastructure.org





Presentation of the IEA HEV task idea in the framework of the booth of the EnergyBus at the Taipei Cycle Show March 2013



EnergyBus charge connector which was released by March 2012, which is based on the proven beta version which has been sold already about 0,5 Million times.



EnergyBus based public transport enhancing Pedelec rental system installed in Summer 2013 at Rostock by the local public transport company



IEC/ISO/TC69/JPT61851-3 Meeting October 2013 at Kreuth Tegernsee



IEC/ISO/TC69/JPT61851-3 Station visit October 2013 at Tegernsee pilot region for the charge and lock cable



Information Exchange with IEC/ISO/TC69/JPT61851-3 initiated by Eduard Stolz of OPI 2020 organization in 2012.

What need to be settled

IEC/ISO/TC69/JPT61851-3

Part 3-3
Part 3-4
Part 3-2

From >n< different connectors like common in todays market:



To a harmonized single connector for charging and discharging:



Proposal by EnergyBus e.V.
Tanna/Germany

From >n< different communication protocols and vocabulary:

Uart, CAN, Lin, RS485,....

To a harmonized single communication language with precisely defined vocabulary:

Proposal CANopen 454
By CAN in Automation e.V.
Nürnberg/Germany



From >n< different battery shapes like common in todays market:



To a harmonized single shape! This is the most difficult item maybe impossible! Many years will be necessary to find a clear direction here! The ropa engineering proposal is maybe the only existing candidate for a solution?

THE PERFECTSHAPE?



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Mayor Technology Trends

Plastic Injection molded frames

Digital chain-less drives

Human adopted motor control

Always online MtoM

Use of standardized rental battery

Public infrastructure will use charge lock cables

Plastic injection molded frames



Injection molded frames have been tried about 30 years ago but failed due to the limitations of nylon at that time. But today new technology allows to have robot production with thermoplastic base materials.

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news 25 Mar 2014

Bringing Parts Production Back to EU

SALES & TRENDS 344 9

TAIPEI, Taiwan – "Bringing Parts Production Back to EU," is the headline of Bike Europe's March edition which is now online available at bike-eu.com. To have more bike components produced in Europe, industry associations COLIBI (for EU bike makers) and COLIPED (for parts makers) are in the process of forming a special Working Group.



Bringing parts production back to Europe must increase flexibility in the supply chain. – Photo Bike Europe

It was one of the hot topics discussed at the Taipei International Cycle Show which took place from March 5 to 8 in the Taiwanese capital. Bringing parts production back to Europe must increase flexibility in the supply chain as dealers increasingly become reluctant to stock bikes and order later and later.

Large scale alloy frame production

Such initiatives must, for example, lead to the large scale (500,000+ units) production of aluminium frames for e-bikes and other high-end models. Indications are there that that this is to take place in expensive Western Europe on an automation level never seen before in the bicycle industry.

Robot technology and machinery from the automotive industry is to be used. More production in Europe of parts like bicycle locks is also said to return from Asia and is to commence within months.

The special Working Group is to lobby Brussels for subsidies, as bringing back components production to Europe creates much needed jobs. More is in Bike Europe's March 2014 edition.

by JACK OORTWIJN 25 Mar 2014

Source: Bike-EU.com

Large scale alloy frame production

Such initiatives must, for example, lead to the large scale (500,000+ units) production of aluminium frames for e-bikes and other high-end models. Indications are there that that this is to take place in expensive Western Europe on an automation level never seen before in the bicycle industry.

Robot technology and machinery from the automotive industry is to be used. More production in Europe of parts like bicycle locks is also said to return from Asia and is to commence within months.

Seems that this initiative is not taking into account the latest frame technologies which will make at least for highly integrated electric bicycles the aluminum frame obsolete due to cost reasons.

Digital chain-less drives



Serial hybrid drive trains are not new but have major advantages compared to direct drives.

Especially for long term reliability and human efficiency.



Human Adopted Motor Control



To regulate the pedelec electric drive system in the optimal way it is critical to know the conditions of the combustion engine (the human) therefore it is good to know data like the heartbeat and the blood pressure.

Recently several clocks are available in the market which are able to monitor the heartbeat and transmit it to the pedelec via bluetooth or W-lan.

Always online MtoM



GSM



GPS



Bluetooth



EnergyBus

ST2

+STROMER-



In March 2014 Swiss pedelec maker Stromer introduced a revolutionary new pedelec the Stromer ST2 which includes all modern standard communication interfaces which allow a wide range of valuable functional enhancements.

I expect that it will be like with computers, after being addicted to a always online machine nobody will miss it again.

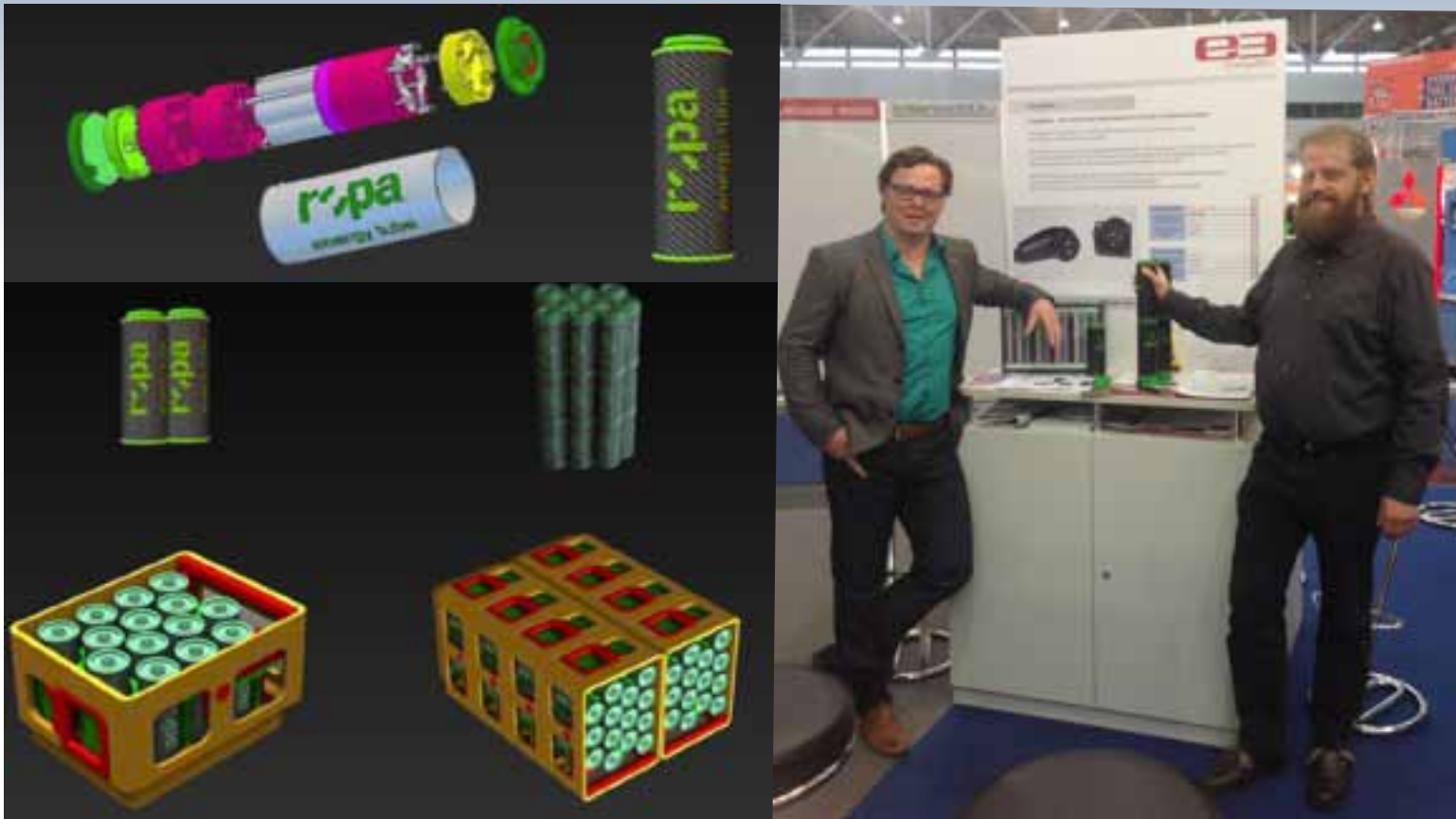


The so called omni range of services offered to the Stromer ST2 model which is enhancing the applications of the pedelec drastically.

Use of standardized rental Battery



Standardization of batteries is a very difficult approach. But it will come anyhow some day. The most advanced and universal applicable approach was shown by german engineering company ropa. The so called energy tube which is a cylinder shaped battery which is able to work as a swarm battery and work in formations up to several gigawatt capacity.



The energy tube is utilizing 18650 cells, the connectors using a combination from NFC and conductive connections for the energy swarm storage interaction.



EnergyBus is as well the chosen communication for a standard battery project organized within the VDMA and presented together with the german vice canceler and minister of economy and energy Mr. Sigmar Gabriel at Hannover Industrial Show 2014 on April the 9th

Public infrastructure Will use charge lock cables



Bicycle locks are a must have feature for urban cyclists, it is a common practice to connect the bicycle with a lock against a fixed city furniture like a bicycle stand. In the project www.charging-infrastructure.org the lock which as well is the charging cable was tried. The second refined generation of it is expected to be tested within the next 12 month.

EnergyBus Members

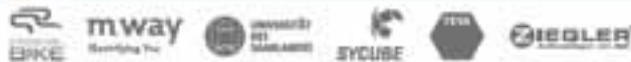
DRIVE UNIT & SYSTEMS



HUMAN-MACHINE INTERFACE



SOFTWARE



ENERGY STORAGE DEVICE & CHARGERS



VEHICLE



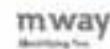
COMPONENTS & DEVELOPMENT HOUSES



CONNECTOR & CABLE-HARNESS



SALES & SERVICE



INSTITUTIONS & PARTNERS



INFRASTRUCTURE & OPERATORS



Member status of Spring 2014

Please participate in international Standardization:

Important tasks are:

Battery safety:

ISO 18243 & CLC/TC21X

Universal charging interface

IEC/ISO/TC69/JPT61851-3



CANopen 454

Public LEV Infrastructure Initiative:

IEA HEV IA Task 23

Taiwan Industry Calls for Asian Bike Standards

LAWS & REGULATIONS

982 4

TAIPEI, Taiwan – At the Taiwan-China Bike Summit, Taiwan Bicycle Association (TBA) chairman and Giant CEO Anthony Lo raised the issue of the differences in national standards of various countries involved in the supply chain of the bicycle industry.



"I recommend bicycle industry members in Taiwan and China to initiate discussions leading to the creation of common standards in both countries," said Anthony Lo. "These standards could be used as a blueprint for other Asian countries."

World-wide implementation

"As Asia is the world's largest market and many industries are concentrated in this part of the world, I think that Asian standards will have a big

"The bicycle industry should initiate common Asian industry standards," suggests Taiwan Bicycle Association chairman and Giant CEO Anthony Lo. – Photo Bike Europe.

influence on the international industry. In the end these Asian standards will be implemented world-wide," stated Anthony Lo.

New name for TBEA

As of January 2014 the Taiwan Bicycle Exporters' Association (TBEA) has changed its name. As the former TBEA now covers all aspects of the cycling and not only bicycle export related issues, the members decided to change the name or the industry organization to Taiwan Bicycle Association (TBA).

by JAN WILLEM VAN SCHAİK 20 Feb 2014 last update:24 Feb 2014

Until now Taiwan and China are not participating in the most relevant standard developments mentioned on the previous page.

I have informed this morning Anthony Lo to make sure that the Taiwanese and Chinese makers will join the international standardization process.

There is only one world and only a single standard will allow global companies like Giant to make globally legal and successful products. 44

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Web: www.EnergyBus.org



Recommended Webpages with additional content:

www.ExtraEnergy.org

www.TestitShow.org

www.BATSO.org

www.EnergyBus.org

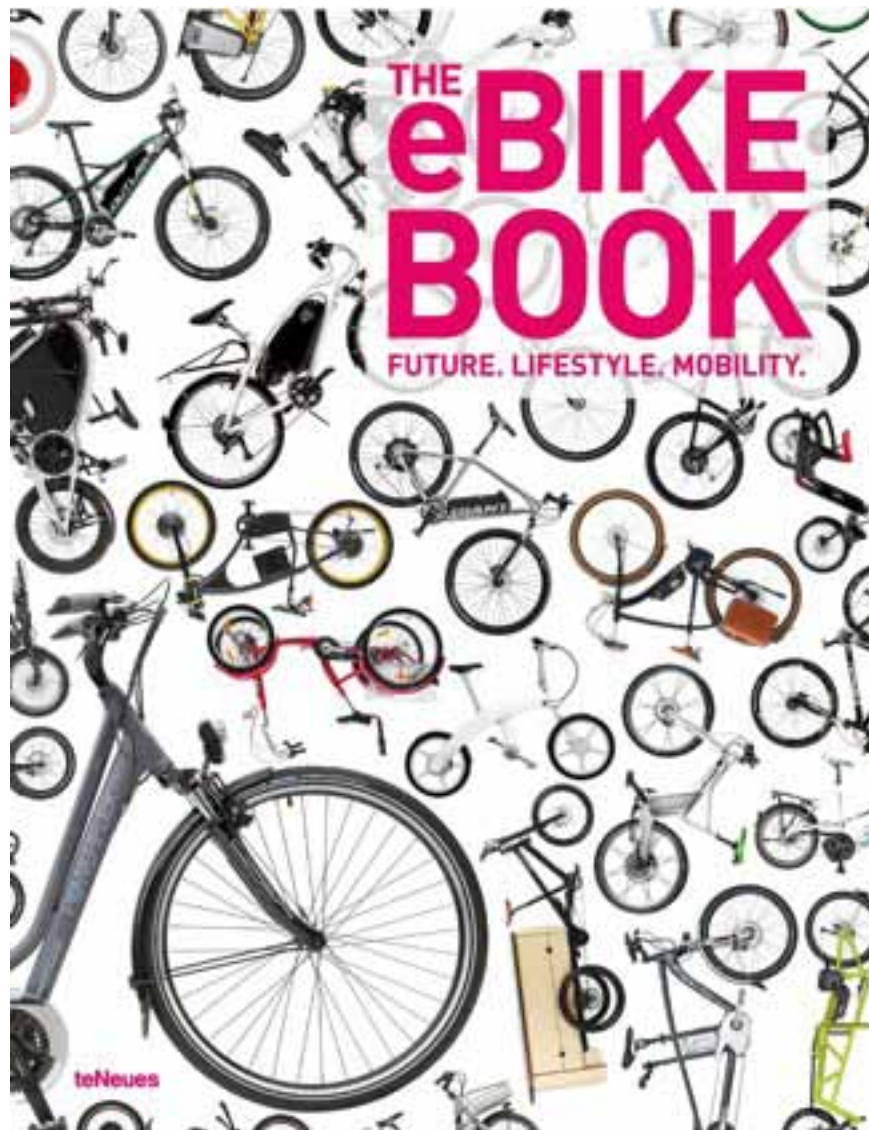
www.LEVConference.org

www.charging-infrastructure.org

www.ieahev.org

www.ebikeaward.de

www.Elektrobike-online.de



Some literature
recommendations:

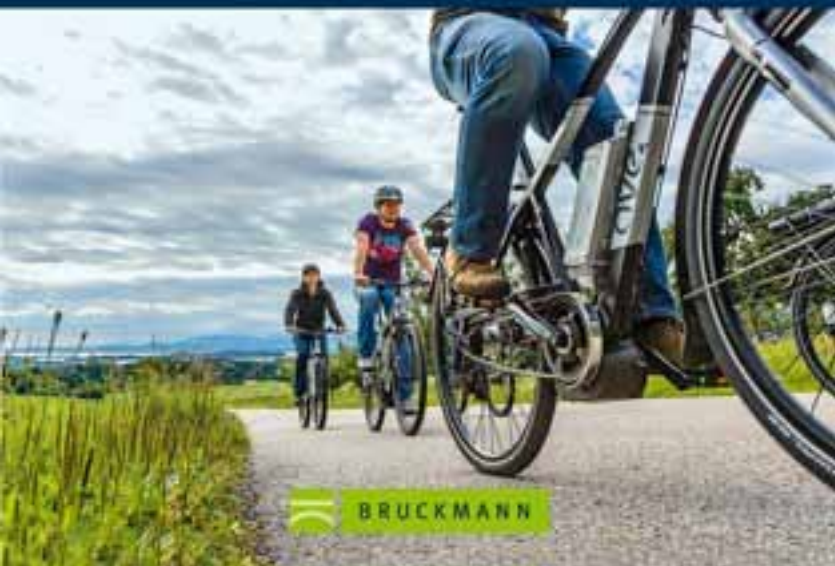
Published spring 2014 at the
teNeues publishing house the
first english and german
language large format book
pedelecs

Peter Grett
Hannes Neupert
Werner Köstle



Technik, Typen
und Kaufberatung

E-Bikes und Pedelecs



Published 2013 the second edition of the electric bicycle book in german language at the publishing house: Bruckmannverlag

GoPedelec!



The GoPedelec handbook developed within the work of the IEA IA 11 Electric Cycles working group and the EU Project GoPedelec.

Financed by the European union, the US department of energy and the swiss Bundesamt für Energiewirtschaft.

Available free of charge in several languages at:
www.GoPedelec.eu

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