



Supporting cities in going full electric

Buses híbridos en SERIE actualizables a 100%
eléctricos con propulsión Siemens

Presentación Bus HIGER con componentes
SIEMENS – Cartagena / Barranquilla

AGENDA:

- **Siemens & Transporte de pasajeros en buses?**
- **Tecnología para buses: Híbridos en SERIE**
- **Propuesta para ciudades que desean migrar a transporte eléctrico en buses**
- **Ejemplo bus HIGER con equipo de propulsión SIEMENS**
- **COMPARACION buses a Gas vs Hibrido**
- **Resumen**

Siemens: Mas de 100 años en el mercado del transporte y mas de 60 años en Colombia



1st Trolleybus



Victoria eCar



eCar Volvo - Siemens



eTruck



eBus Viena



Hybrid bus London

600 Buses on order

19th century
Pioneer of electric vehicles

20th century
Leading provider of electric drives for trains and public transport

21st century
Global system provider for low-emission electric mobility



Camiones Dielelectricos con propulsión Siemens en el Cerrejón



Tranvía de Ayacucho – Inverters propulsión Siemens

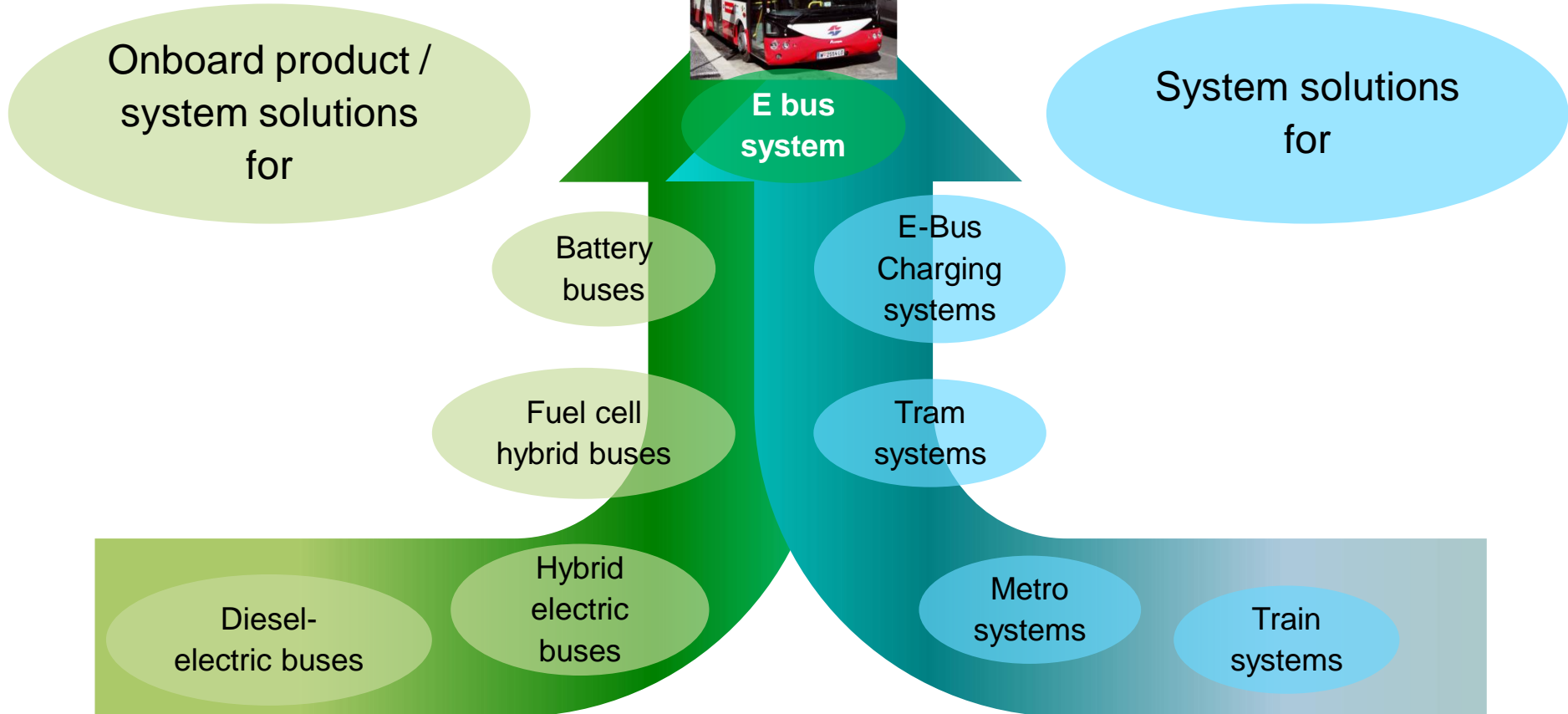


RTGs Buenaventura

4 de aproximadamente 70 proyectos de buses híbridos / eléctricos de Siemens

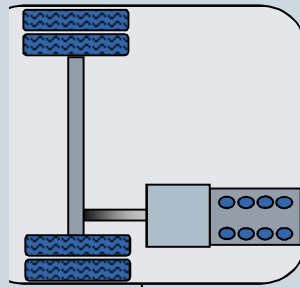


Siemens le ofrece a **BOGOTÁ** su conocimiento de mas de 15 años de sistemas híbridos y eléctricos así como su conocimiento de infraestructura

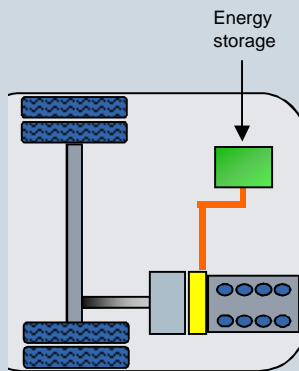


Serial vs. Parallel hybrid propulsion

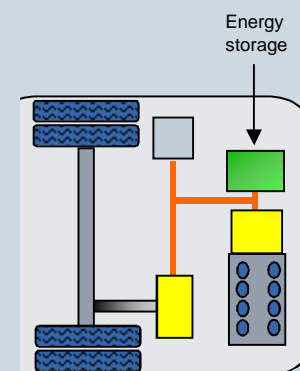
Conventional drivetrain



Parallel Hybrid



Serial Hybrid



New Bus for London (“NBfL”) extreme “stop-and-go” operation

SIEMENS



04 November 2011 | [UK](#)

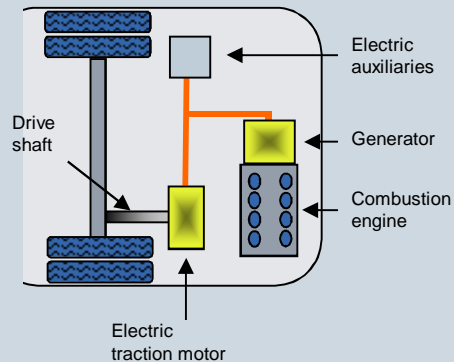
The prototype being tested at the Millbrook Proving Ground in Bedfordshire has produced impressive fuel figures - **11.6mpg** which compares to 8.6mpg for a hybrid bus and **5.8mpg** for a diesel bus.

© Siemens AG 2013. All rights reserved.

De diesel electrico a hibrido a 100% electrico (eBUS)

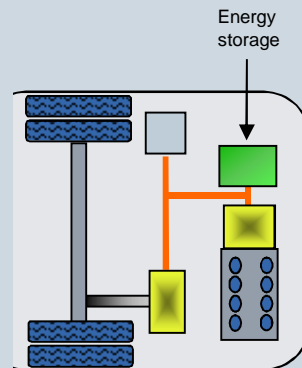
Con Siemens ELFA "se puede"! → Escalabilidad y Flexibilidad

Diesel Electric



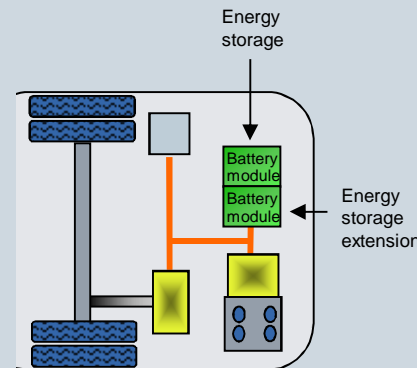
Hybrid

- + UCap storage



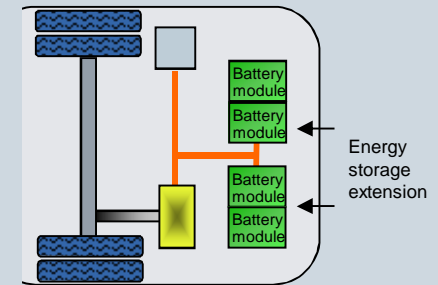
Plug In Hybrid

- + Battery storage extension
- Downsize diesel engine

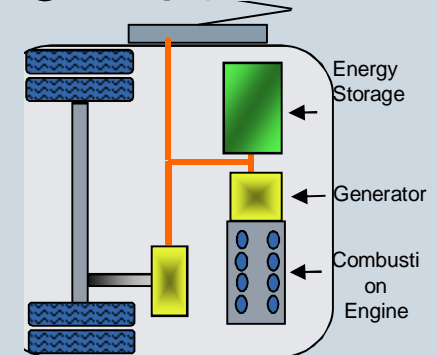


Pure Electric

- + Battery storage extension
- Remove diesel engine



+ Pantograph



Especialmente los operadores favorecen la implementacion incremental. Ciudades entienden que el salto inmediato a 100% electrico es complicado

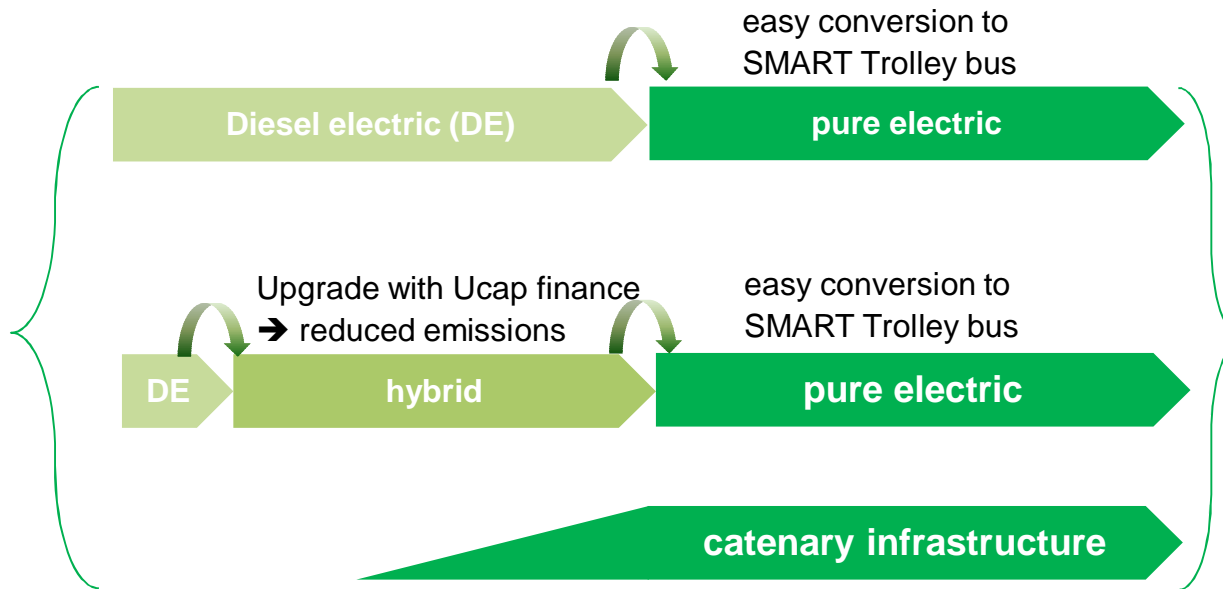


Purchasing now new buses with conventional drive train will make it close to impossible to shift towards electric buses for more than another decade

diesel bus




diesel electric



Siemens en la Feria de Movilidad y Transporte en Bogotá 2013



unrestricted / © Siemens AG 2014. All Rights Reserved.



HIGER



SIEMENS

HIGER SIEMENS Serial hybrid UCAP 12m padrón bus, for Bogotá





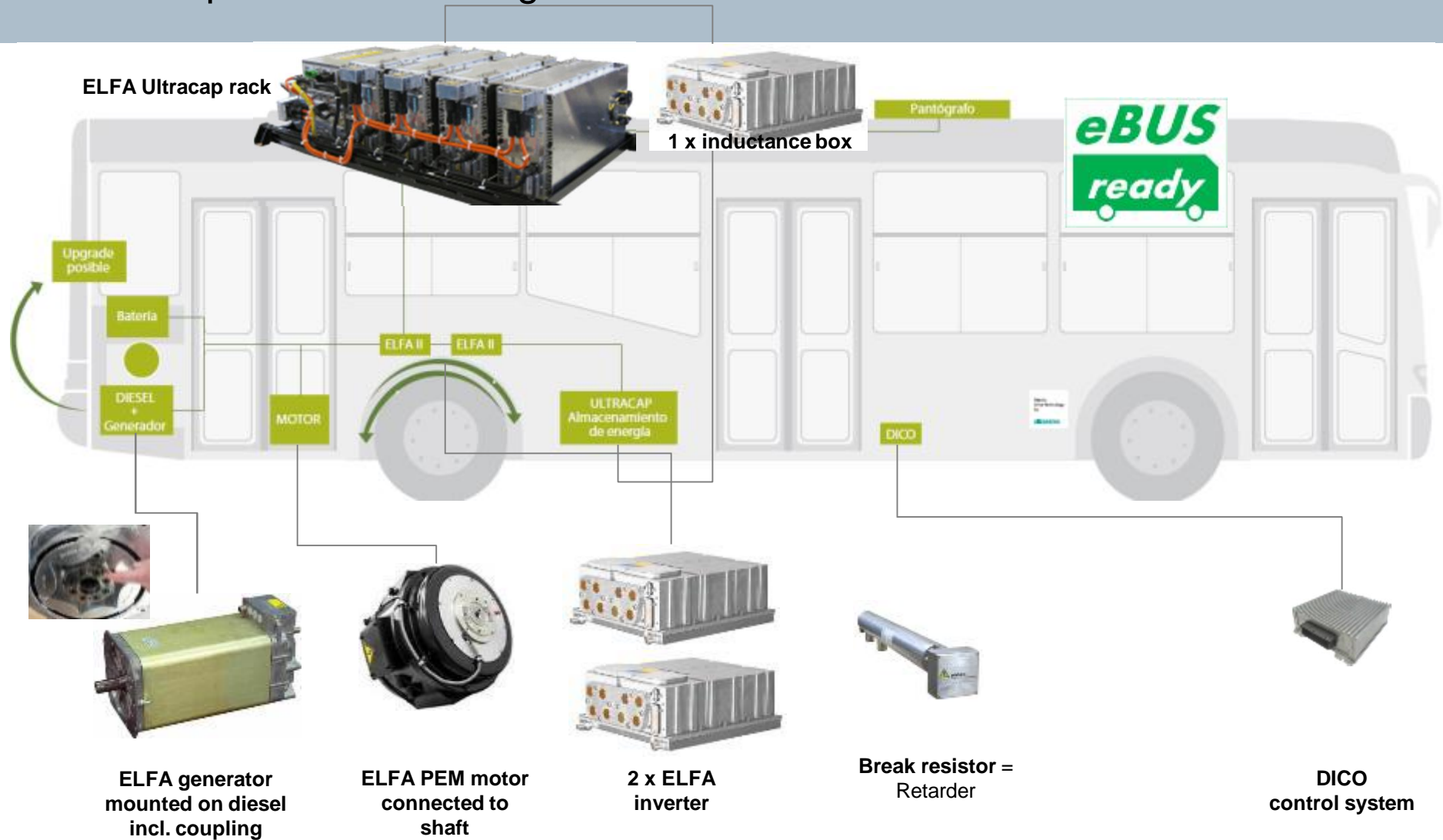
HIGER



SIEMENS

Siemens Hybrid System

all components according Automotive Standard TS 16949





HIGER



SIEMENS

High visibility and versatility





SIEMENS

The HIGER UCAP Hybrid bus has been designed according to Colombian regulations





SIEMENS

SIEMENS powers the bus, cummins generates e-power, UCAPS on roof store the breaking energy





HIGER



SIEMENS

80 PAX capacity, clear and functional interiors





SIEMENS

Elevator for easy access, ergonomic drivers seat





SIEMENS

High quantities upon order - Aprox 4 months delivery time

Order in March can ensure up to 500 units in July!



New design as proposed by UNIVERSIDAD NACIONAL





SIEMENS

The 18m bus will also be provided according to Bogota spec with Siemens UCAP Hybrid system



Electric and Hybrid
Drive Technology
by

SIEMENS

unrestricted / © Siemens AG 2014. All Rights Reserved.



HIGER



SIEMENS

The 27m bus will have 2 driven axles and thus allow for very good acceleration, increasing the capacity





HIGER



SIEMENS

The 27m allows for a pantho upgrade



Electric and Hybrid
Drive Technology
by

SIEMENS

New design as proposed by UNIVERSIDAD NACIONAL



**HIGER****SIEMENS**

BRT Hybrid buses compared to diesel & gas buses

Feature	Gas Bus	Diesel Bus	Higer-Siemens Hybrid
Acceleration	slower	normal	fast
Passenger safety	normal	normal	high (no jerks)
Transport capacity	Lower due to lower travel speed (lower acceleration)	normal	Higher due to higher travel speed (fast acceleration)
PM emission	reduced	normal	reduced
CO ₂ emission	higher	normal	reduced
Noise emissions @ station	normal	normal	Significant lower
Passenger comfort	normal	normal	greatly improved (less noise, no jerks)
Driver comfort	normal	normal	greatly improved (less noise, no jerks)
Maintenance	higher over the bus life	normal	Reduced
Infrastructure	Special gas fillings stations needed	normal	normal
Fuel consumption cost	lower when politically priced	normal	Approx. (25 – 35) % lower
Image	normal	normal	Significantly increased → more people will use the BRT system
“eBus ready”	no	no	yes

unrestricted / © Siemens AG 2014. All Rights Reserved.

**HIGER****SIEMENS**

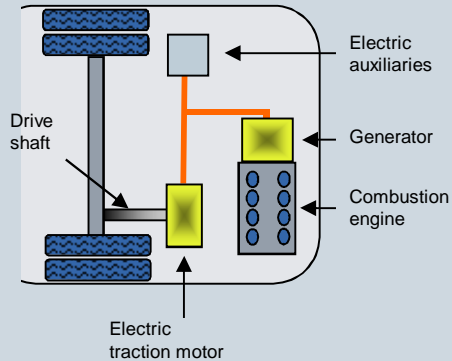
3 Platforms almost same parts: 12m, 18m, and 27m busses use same Siemens components

Component	12m	18m	27m
Generator 1FV5168	1	1	1
Coupling components	1	1	1
Aux. motor	1	1	1
Motor 1DB2016	1		2
Motor 1DB2022		1	
ELFA 4ph 600A	1	1	1
ELFA 4ph 600A iVPM	1	2	2
ELFA IB	1	1	2
Aux. Kombi	1	1	1
DICO	1	1	1
Braking resistor	1	1	1
Insulation monitor	1	1	1
Signal cables	1	1,5	2
Power cables	1	1,5	2

De diesel electrico a hibrido a 100% electrico (eBUS)

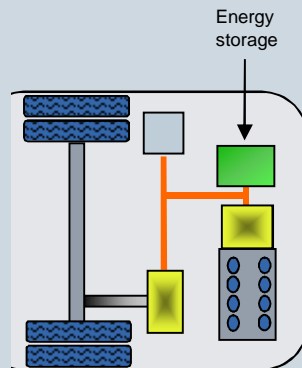
Con Siemens ELFA “se puede”! → Escalabilidad y Flexibilidad

Diesel Electric



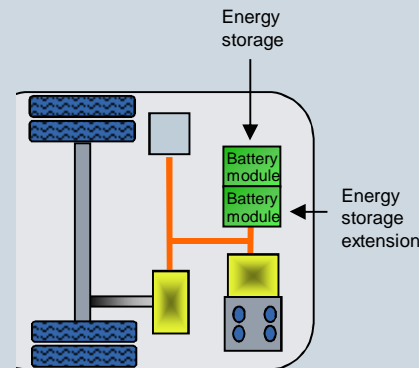
Hybrid

- + UCap storage



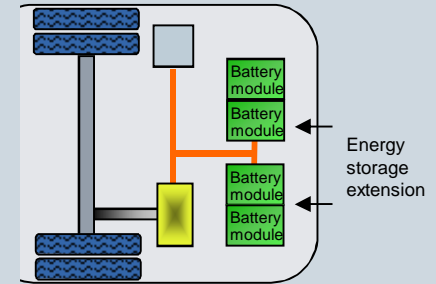
Plug In Hybrid

- + Battery storage extension
- Downsize diesel engine

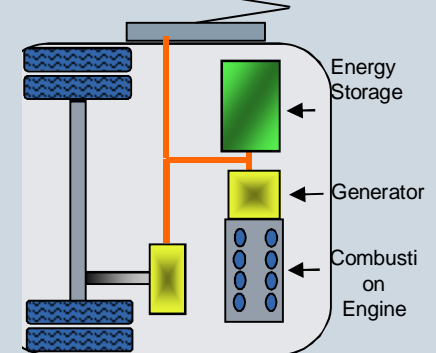


Pure Electric

- + Battery storage extension
- Remove diesel engine



+ Pantograph



Gracias por su atención!



Felipe Santander
Philip.santander@siemens.com

Siemens Colombia S.A.
Km 8,5 Via Medellin, Tenjo
Colombia