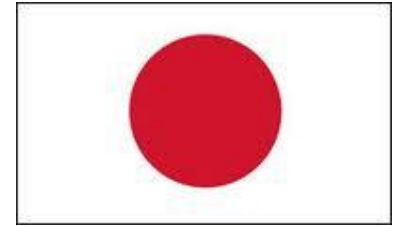




**Ministry of Development, Industry
and Foreign Trade**

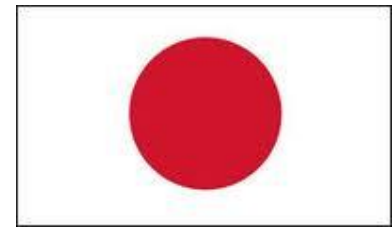


Brazilian Experience: Building a Prototype Electric Car

FERNANDO JOSÉ LOPES CASTRO ALVES
Engineer
São Paulo-SP, Jul 7, 2011



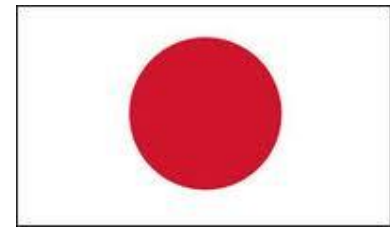
Objective



**To present the experience of
converting a national vehicle
driven by internal combustion
engine in electric vehicle.**



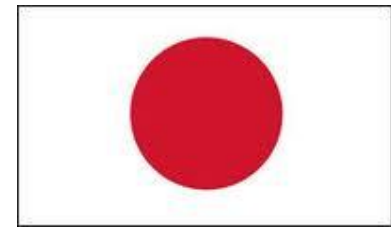
Topics



- ❖ **Introduction**
- ❖ **Why Electric Vehicle?**
- ❖ **General Market Data**
- ❖ **Impacts on the Brazilian Electric System**
- ❖ **Market Research**
- ❖ **Poraquê Project**
- ❖ **Final Highlights**
- ❖ **Our business plan**



Introduction

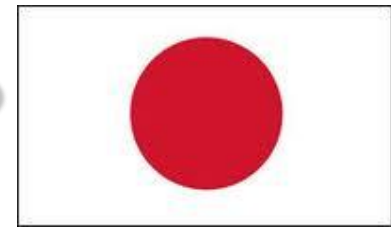


- ❖ **Elifas Gurgel:** Army Reserve Officer, Computing Engineer, former President of Anatel (Telecommunications Agency), founder and President of 4GVE
- ❖ **Fernando Castro Alves:** Mechanical Engineer, large experience in industry management, research, development and innovation
- ❖ **4GVE:** Brazilian company focused on the research and development of solutions for the electric vehicle industry

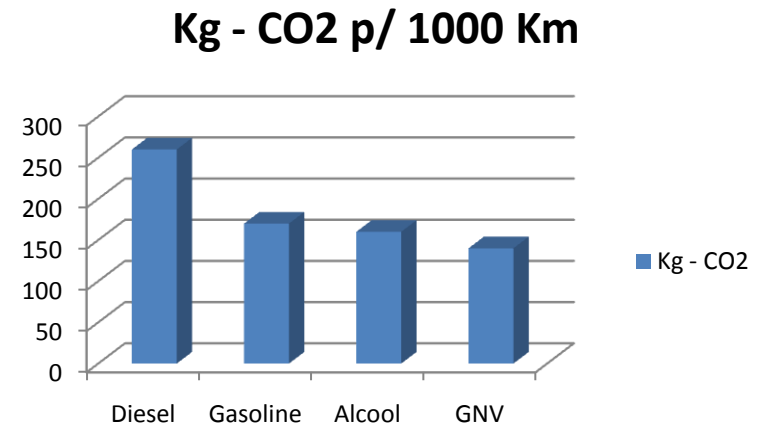
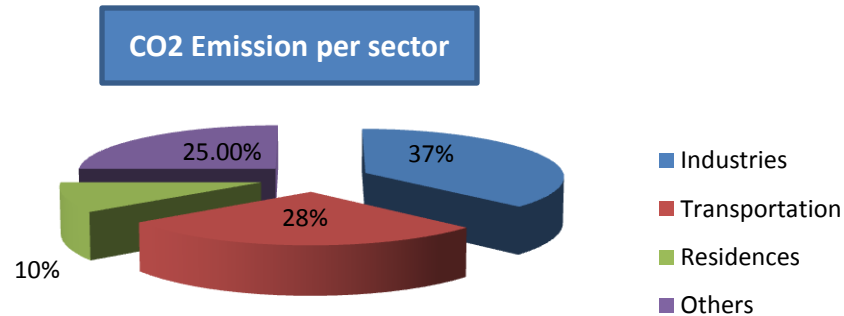




Why Electric Vehicle?

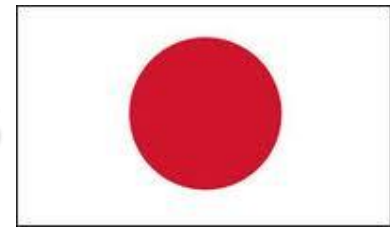


- ✓ Increased Torque
- ✓ Increased Efficiency
- ✓ Quietest
- ✓ Greater simplicity
- ✓ Greater reliability
- ✓ Uses regenerative brake
- ✓ In use, do not pollute the environment
- ✓ Requires less maintenance
- ✓ When stopped and in use, do not consume fuel
- ✓ Can be used for energy storage
- ✓ Flexibility in relation to power generating sources
- ✓ More power per weight unit or volume unit





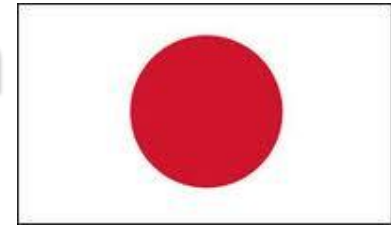
Market Data Estimates



- By 2013: Wind farms shall quintuple its installed capacity in Brazil;
- In 2020:
 - Worldwide: 80 Million vehicles – 10% will be electric
 - In China: 50% of all new vehicle sales, will be for electric units



Impacts on the Brazilian Electric System



The Brazilian power system do not have problems to meet the demand of electric cars.

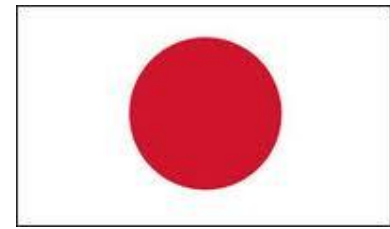
Estimates for 2020:

- 4 million electric cars (about 10% of the total of vehicles, planned for that year)
- 10,000 km/year, per car
- consumption electricity would result in about 6 TWh/year
- less than 1% of total consumption of electricity

Projections: by 2025 the energy consumption of electric vehicles can reach up to 3% of the market, requiring only a minor adjustment on the schedule for expanding the energy supply.



Poraquê Project

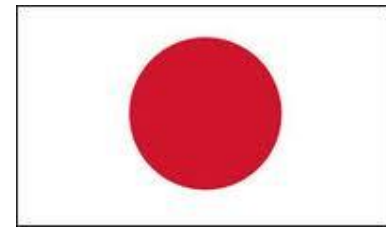


Poraquê: a fish which name comes from the Tupi Indian language and means "sleepy" or "numbing".

Produces an electrical discharge that generates 300 V with 0.5 A to 1500 V with 3 A



Poraquê Project



Financed by BNB Bank



VW Gol Generation 4

Lithium Ion Battery: 23.8 kWh

Motor: 52 kW (~ 70 hp)

Autonomy: 150 km

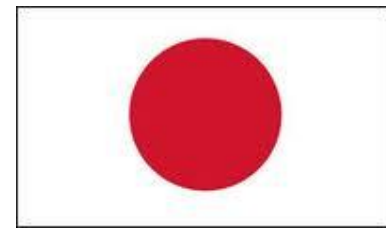
Maximum speed: 130 km/h

Recharge Time: 8 h

Application: Urban use



Poraquê Project



Gol Gasoline
+/- US\$ 0,14 p/ km

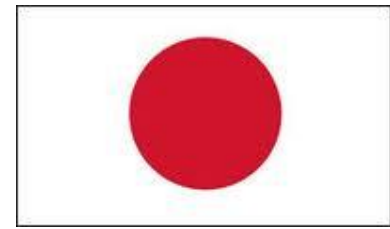
Gol Poraquê
+/- US\$ 0,04 p/ km



	Price US\$	Aver. Consumption
Gasoline	1,70 per liter	12 km per liter
Electricity	0,234656 kWh	0,15 a 0,20 Wh/km



Poraquê Project

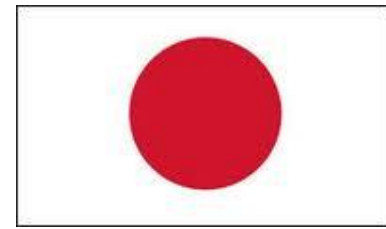


- **MAJOR COMPONENTS**

- **Battery**
- **Battery Management System**
- **Battery Charger**
- **Shunt**
- **Fuses**
- **Cables and Connectors**
- **Inertial switch**
- **Motor**
- **Controller**
- **DC-DC converter**
- **Contactors**
- **Vacuum Pump**
- **Voltmeter and Ammeter**



Poraquê Project

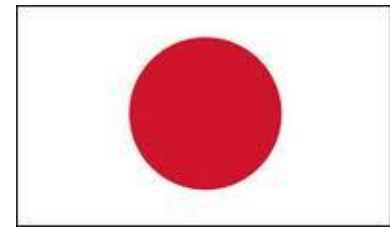


Development of Coupling to the Transmission System





Poraquê Project

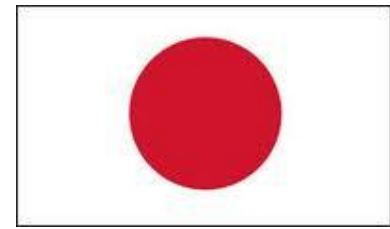


Development of flanges coupling





Poraquê Project



**Removal of the combustion engine
and its associated systems**

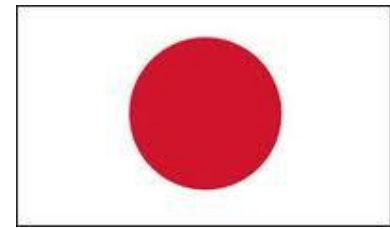


Electric Motor Assembly





Poraquê Project



Building Control Platform

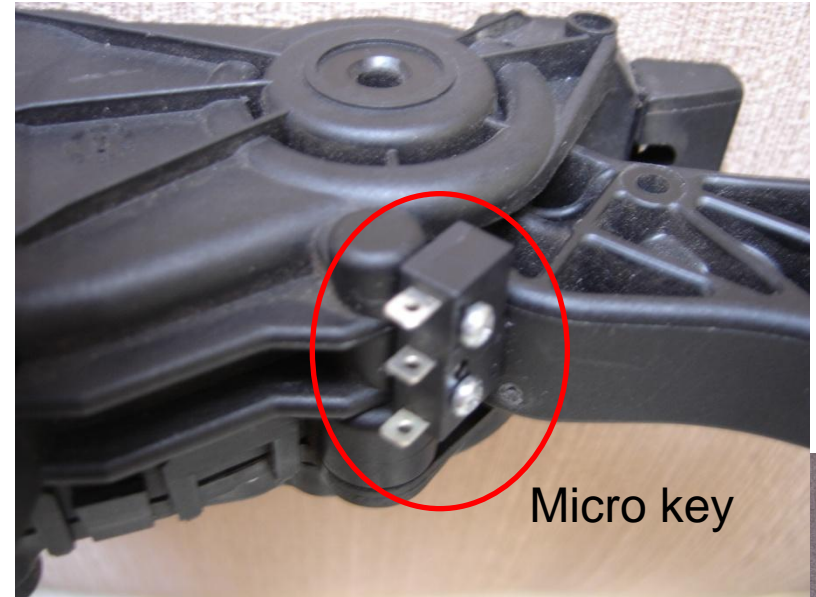
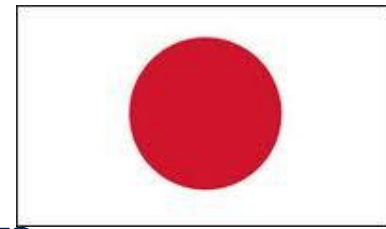


Fixed Control Platform



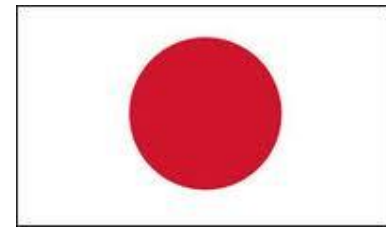


Poraquê Project Electronic Accelerator

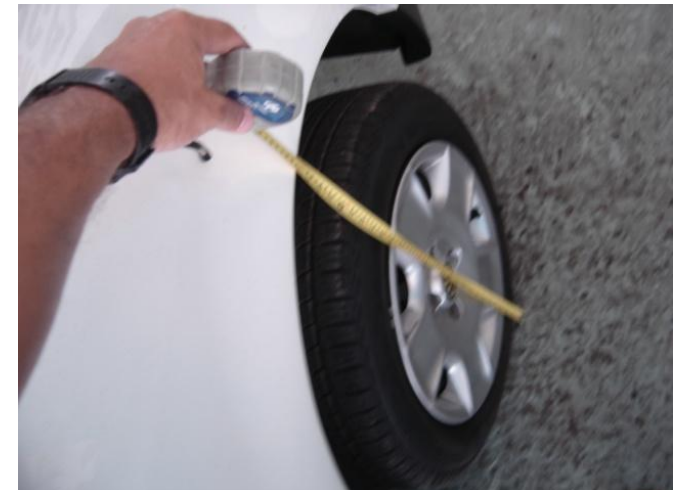




Poraquê Project

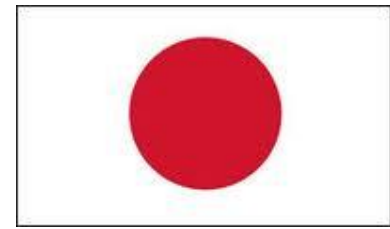


Strengthening Rear Suspension





Poraquê Project



40 Lithium Batteries

Model: SE 180AH

Total Weight: 224 kg

Technology: Lithium Ion

Nominal Capacity: 180Ah

Operating Voltage: 2.5V ~ 4.25V

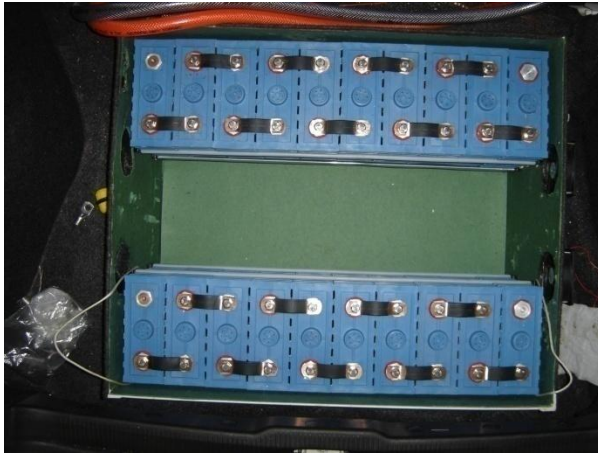
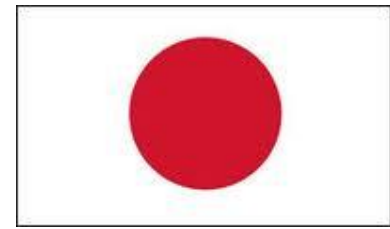
Dimensions: 182 × 279 × 71 (mm)

Manufacturer: Sky Energy (CALB) - China

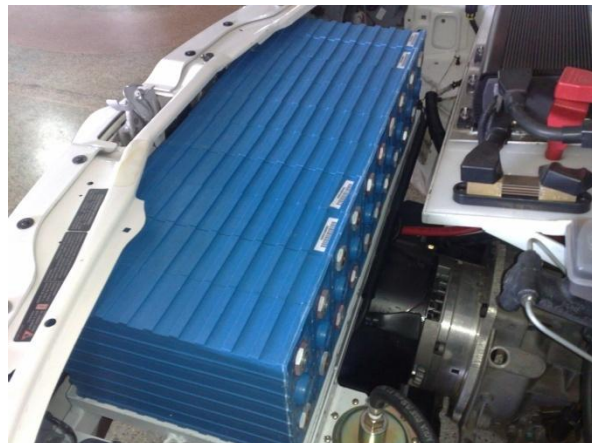




Poraquê Project



**Rear Battery
Bank
(30 Units)**

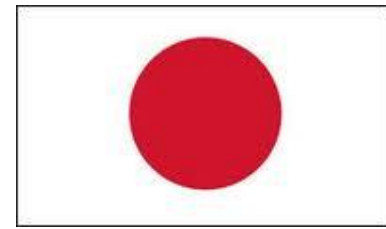


**Front Battery
Bank
(10 units)**

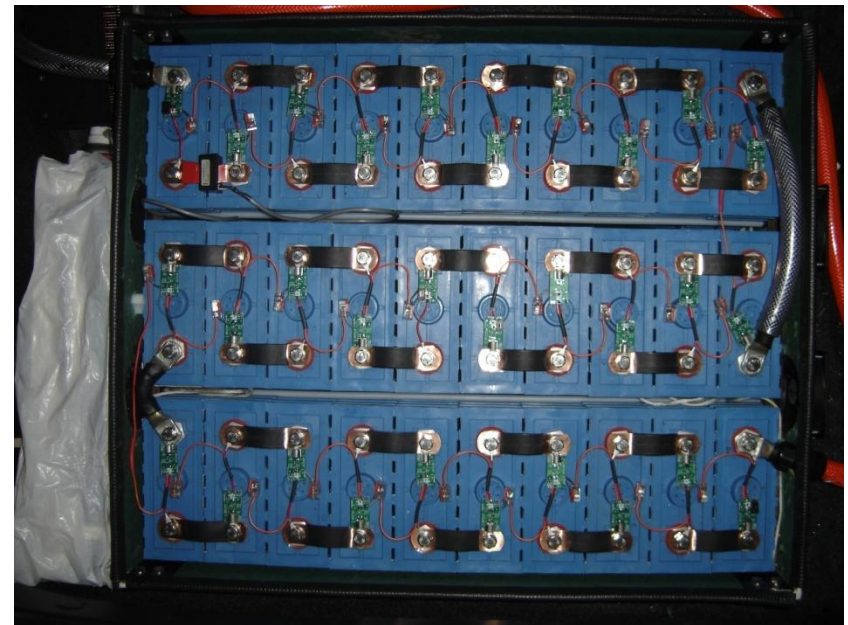
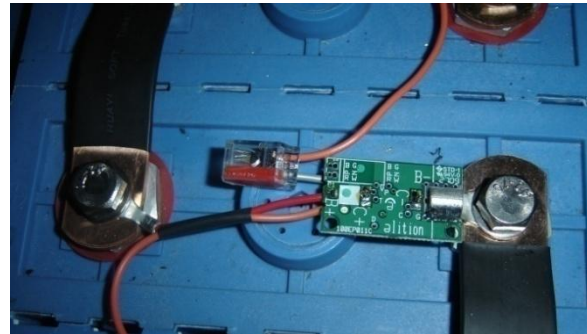




Poraquê Project

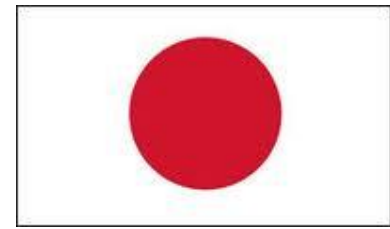


Battery Management System - BMS





Poraquê Project



Power Supply and Battery Charger



Regulation

Vehicle Inspection in 02/09/2009

		SETA INST. TEC. DE INSPEÇÃO VEIC. LTDA		LAUDO TÉCNICO Nº: 3874	
CNPJ: 02.780.8778003-88		QUADRA 02, LOTES 825/835		NÚMERO DA OS 04693-09/09	
CEP: 70633-200 - SAAN - BRASÍLIA/DF		Teléfono: 61 3362 7844 - FAX: 61 3362 7844			
BRASÍLIA/DF, 2 de Setembro de 2009					
O presente documento é relativo à inspeção técnica de segurança veicular conforme RTQ/ET realizado no veículo abaixo descrito:					
Proprietário: ELIAS CHAVES GURGEL DO AMARAL		Estado/DF		Bairro: ASA NORTE	
CNPJ/CPF: 497.040.857-61		CEP: 70730705			
Endereço: SHCGN 703 BLOCO E AP 405					
Cidade: BRASÍLIA					
CARACTERÍSTICAS ORIGINAIS					
Espécie/Tipo	PASIAUTOMOVEL/NAO APLIC	Marca/Mod.	VW/GOL 1.0 GIV		
Capacidade	SP	Cor	BRANCA		
Ano Fab.	2008/2009	PBT	ND		
Combustível	ALCOGASOL	Potência/Cil.	71CV		
Chassi	9BWAAG05W19T046338	CMT	ND		
		Placa	JJI-1266		
CARACTERÍSTICAS ATUAIS					
Espécie/Tipo	PASIAUTOMOVEL/NAO APLIC	Marca/Mod.	VW/GOL 1.0 GIV		
Capacidade	SP	Cor	BRANCA		
Ano Fab.	2008/2009	PBT	ND		
Combustível	PROPULSOR ELETTR	Potência/Cil.	71CV		
Chassi	9BWAAG05W19T046338	CMT	ND		
		Placa	JJI-1266		
DESCRIÇÃO DOS SERVIÇOS / METODOS DE ENSAIO					
O veículo teve sua estrutura em geral e demais itens de segurança analisado; os métodos de ensaios utilizados nesta inspeção de segurança veicular foram de aspecto: visual, dinâmico e estático; aonde poderão ser avaliados toda a sua estrutura, e normalização do veículo.					
RESULTADO					
O veículo foi submetido aos ensaios acima descritos e atendeu satisfatoriamente as normas de qualidade deste organismo de inspeção, nada obsta do ponto de vista de segurança veicular que possa impedir de circular, considerando o atual estado do veículo; este laudo não pressupõe qualquer garantia aos itens vistoriados, nem isenta o montador e/o proprietário do veículo de suas responsabilidades quanto quaisquer danos pessoais e materiais, provocados por problema de montagem, manutenção ou utilização incorreta, considere-se o veículo aprovado nos ensaios a que fora submetido.					
<input checked="" type="checkbox"/> APROVADO		<input type="checkbox"/> REPROVADO		Data Inspeção: 2/9/2009	
Data: 2/9/2009				Data Emissão: 2/9/2009	
Obr: Técnico e/ou Eng. Mecânico				Data Vencimento: 2/10/2009	
VALDIVINO PEREIRA DA SILVA / CREA 100678104/7					
QUADRA 02, LOTES 825/835 - CEP: 70633-200 - SAAN - BRASÍLIA/DF Telefone: 61 3362 7844 - FAX: 61 3362 7844					

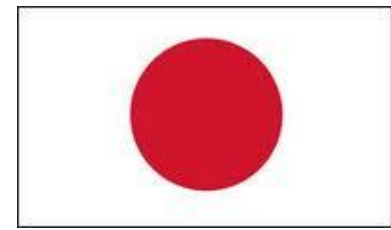
All requirements satisfied. Vehicle legally free to circulate.



ORDINANCE No. 279(*) OF APRIL 15th, 2010: makes it possible to convert vehicles powered by internal combustion engine in electric traction.



Poraquê Project

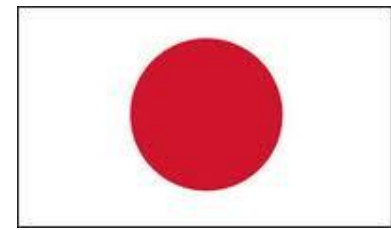


Institutional Support





Poraquê Project

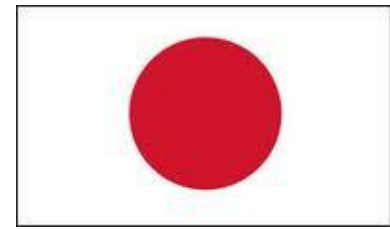


Participation in Challenge Bibendum Rio2010





Poraquê Project



**Presentation at the BNB bank
(State of Ceará – Br)**

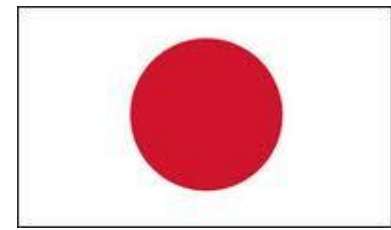


**Entrepreneur Fair
(State of Ceará – Br)**





Poraquê Project



Presentation to the Governor of Ceará state



Folha de São Paulo 20/05/2010



Turista em Madri recarrega carro elétrico em cabine telefônica que também serve de posto

Possible Government Incentives for Electric Vehicles in Brazil

Governo prepara incentivo à produção de carros elétricos

Planalto pretende estimular o início da fabricação desse tipo de veículo no país e a adoção de ônibus híbridos nas grandes cidades

Segundo o Ministério da Fazenda, se os carros elétricos responderem por 10% da frota total, haveria demanda adicional por energia de 0,2%

DA SUCURSAL DO RIO

O governo federal vai lançar na próxima semana um estudo com as diretrizes sobre as ações para o desenvolvimento do carro elétrico em maior escala no país.

O secretário de Políticas Econômicas do Ministério da Fazenda, Nelson Barbosa, afirmou que o Brasil está muito atrasado e tem gargalos tecnológicos para fabricar veículos desse tipo.

“Cabe ao governo estimular a pesquisa. Esse estudo vai preparar um diagnóstico sobre o que precisa ser feito para que o carro elétrico tenha participação significativa na frota.”

Atualmente, o carro elétrico tem uma taxa de IPI (Imposto sobre Produtos Industrializados) acima da dos veícu-

los comuns. Barbosa disse que essa distorção será corrigida, mas não de forma imediata. Por ora, comentou, não há qualquer previsão sobre desonerações para esses veículos.

“A recomendação é corrigir, mas isso tem que ser feito na velocidade adequada. Se for de imediato, vai estimular importações, já que o carro não é feito no país”, afirmou.

O governo planeja ainda estimular as compras de ônibus híbridos (a combustão e eletricidade) para as grandes cidades.

O consumo por parte dos carros elétricos não sobrecarrega-



Esse estudo vai preparar um diagnóstico sobre o que precisa ser feito para que o carro elétrico tenha participação significativa na frota

NELSON BARBOSA
secretário de Políticas Econômicas do Ministério da Fazenda

ria a matriz energética brasileira. De acordo com Barbosa, se os carros elétricos responderem por 10% da frota total, haveria uma demanda adicional por energia de 0,2%.

“A ideia é incluir essa demanda adicional no próximo plano decenal de energia”, afirmou.

Cenário

No exterior, vêm crescendo a produção e o incentivo aos veículos híbridos (movidos a mais de uma fonte de energia).

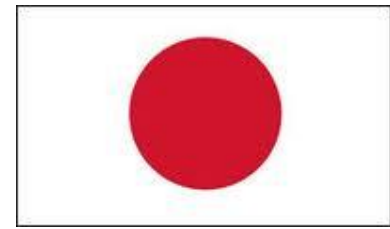
Na Europa, há países com impostos vinculados aos índices de emissões. Se o carro polui muito, é mais tributado. Nos Estados Unidos, o governo de Barack Obama também adotou incentivos à compra de carros elétricos e menos poluentes.

No Brasil, a Petrobras Distribuidora inaugurou no ano passado, no Rio, o primeiro posto que oferece recarga de veículos elétricos a partir de energia solar. A cidade, no entanto, ainda tem poucas dezenas de veículos elétricos ou híbridos.

(CIRILO JUNIOR)



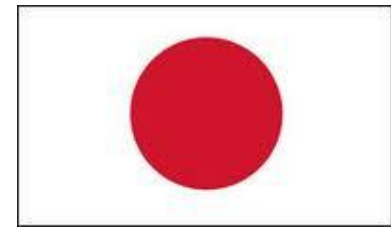
Poraquê Project



- There will be many incentives for the development of a national electric vehicle (tax incentives, land availability, financing, etc);
- **Activities:**
 - import of “conversion kits” and the offer of vehicle converted fleets for corporations in the governmental and private sectors;
 - Import and manufacture of spare parts, electric energy storage systems, metal-mechanisms, components and electronic accessories for vehicles powered by electric motors
 - Provision of leasing services, maintenance and technical assistance for vehicles in general, storage systems, electric power, well as spare parts, components and electronic accessories or metal-mechanics;
- **Final Objective: development and manufacture of a local electric vehicle to participate in the expansion of the Brazilian market**



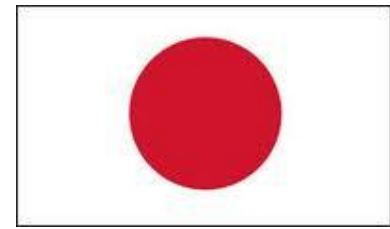
Final Highlights



- **Electric vehicles are already a reality in all developed countries;**
- **Standards for the protection of the environment will restrict the use of internal combustion engines which will enforce the use of electric vehicles;**
- **Brazil is a promising market due to the intensive use of small vehicles by a high percentage of the population;**
- **The use of electric energy represents significant savings for most people**



Final Highlights

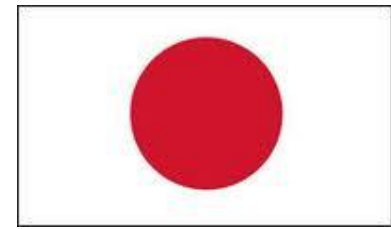


- **Electricity availability should not be a problem in Brazil due to its high production capacity in regular and renewable sources such as solar and wind energy;**
- **Many opportunities for the development of innovative local technologies for the transportation system;**
- **Possibility of applying this technology in public transportation**

With more than 10,000 km run, the Poraquê Gol saved the atmosphere about of 1.7 tons of CO₂



Our Business Plan



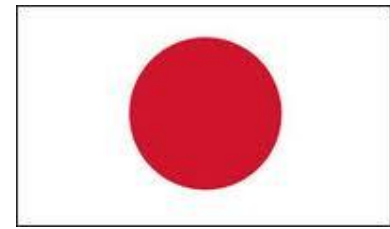
**Location: Aquiráz
(18 km from Fortaleza – Ceará)**



Logistics: Port of Pecém (80km), Pinto Martins International Airport (20km), BR 116 (15km)



Our Business Plan



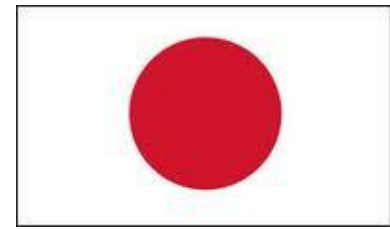
START UP: Conversion of 20 Fiat “Novo Uno” to a car rental company in Brazil.

Term: 6 months

Investment: US\$ 1,350,000.00



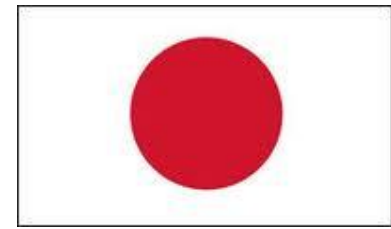
Our Business Plan



Second Step: Conversion of 100 vehicles for public transport in Fortaleza - Ce, monitored and managed by a private company specializing in public transport.

Term: 12 months

Investment: US\$ 7,650,000.00



Thanks!

4GVE – Indústria de Veículos Elétricos Ltda

Engº Fernando Castro Alves

+55 85 9981 2185- fernandolcalves@gmail.com

Engº Elifas Gurgel do Amaral

+55 6181889396- contato4gve@gmail.com

Office: Av. Santos Dumont, 2626/313 – Fortaleza - Ce

www.evbrasil.com