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Corporate Sustainability Track

2nd Prize

The Rise of a New Industry: *Business Model Innovation at the Intersection of Energy and Mobility*

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The Rise of a New Industry:

Business Model Innovation at the Intersection of Energy and Mobility

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Abstract

Cofely, a large international technical services provider, is observing important changes at the fringes of its industry. Two industries that have experienced pressure towards being more environmentally responsive in the past, the automotive industry and the energy industry, are converging due to the emergence of electric cars. The Dutch subsidiary of Cofely is therefore searching for new business models at the intersection of energy and e-mobility. In the Netherlands, a front runner of sustainable mobility, firms and other stakeholders are increasingly identifying the essential role electric vehicles can have for a balanced and sustainable energy system in the future. This new industry at the intersection of energy and e-mobility is developing at a fast rate, with innovative start-ups as well as existing firms establishing themselves across a new, not yet clearly defined, value chain. This value chain is highly integrated via ICT and stretches from energy production on the one end of the spectrum to mobility services on the other. Cofely wants to become pioneer in this new industry and particularly see how it can position itself with a new business model building on its core competences.

Introduction

"Seeing the recent developments in the automobile industry with regard to electric vehicles, I'm excited about how the technical services markets for energy related firms in Europe will evolve" Albert Peters said gazing out of the window of his corner office overlooking the skyline of Amsterdam. Playing with his pen, the vice president Corporate Strategy of Cofely, one of the major European technical services companies, continued talking to the business development manager Bram Kip "The pressure is on, the board wants to see a plan of how we are going to exploit this major opportunity. We need to think about new ways of creating and capturing value. There are signs of a new industry arising, on the edge between mobility and energy, and now, since the momentum is increasing, we should not miss this train! Let's get a better grip on the market and let's develop a suitable business model for Cofely that we can present at the next board meeting."

Bram Kip was excited about this assignment. He just graduated from one of the leading business schools in Europe and started two months ago as a business development manager. During his studies he took courses in Mobility Markets, Sustainable Innovation Management and Strategic Management, thus he knew about the major strategic issues in the market, the new players as well as the uncertainty with regard to the 'right' business model for sustainable technologies (Baden-Fuller & Haefliger, 2010; Bohnsack, Pinkse & Kolk, 2014; Richter, 2013). Looking ahead, Tim wondered how Cofely could position itself in this new industry. What would be a suitable business model? How could a value proposition look like? And how would the business model and value proposition be influenced by local contingencies?

Cofely: Company Profile

Cofely, a subsidiary of GDF Suez[1], is a large technical services provider, employing almost 95,000 people across 40 different countries. In Europe it is the number one in terms of energy efficiency services and record yearly revenues of €15,7 billion (details in **Exhibit 1**). The company provides innovative and sustainable state-of-the-art concepts and solutions for a variety of industries including pharma, foods, buildings, healthcare, marine & offshore, oil & gas, infrastructure and chemicals.

[1] GDF Suez changed its name to ENGIE after writing this case in 2016.Cofely has also adopted the name ENGIE.

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Exhibit 2 provides a visual overview of the sectors in which Cofely is active as well as its activities within these sectors. Cofely's competences are especially to integrate energy systems such as the energy grid, airports, buildings, industrial sites and to create energy efficient solutions, to change behaviour of consumers and to diversify energy resources. Above all, Cofely distinguishes itself through its integrated knowledge of energy systems, and therefore focuses on offering integrated solutions that take care of all the energy-related needs of its clients.

Sustainability is central to Cofely's activities. In fact, its vision is "to invest in responsible, sustainable growth now in order to keep the Earth liveable for generations to come" (Cofely, 2016). To that end, Cofely sets out to ensure that all its stakeholders can achieve sustainable growth (Cofely, 2014).

Lately, Cofely has also taken a special interest in markets related to electric mobility; an upcoming industry where new opportunities are arising due to the changing landscape of the mobility and energy sector, largely caused by an increasingly urgent need to reduce global CO_2 emissions. This has led to the appearance of new, innovative business models, which are potentially of great commercial interest for technical service providers and other energy-related corporations and simultaneously hold the promise to make mobility and energy solutions more sustainable.

Strategic Issues in the Emerging Industry

Bram Kip knew that the increased awareness towards the energy and environmental challenges had gained global attention in the past decade. Although this has put pressure on almost all sectors of the economy, two industries in particular have received increased focus; the automotive industry and the energy industry.

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Pressure on the Automotive Industry

Transportation accounts for about 22% of greenhouse gas emissions, and the International Energy Agency projects that the worldwide demand for transportation fuel demand is to grow by almost 40% by 2035 (IEA, 2012). With an increasing global awareness for the need to cut back on emissions, this means that there is tremendous pressure on the automobile industry to develop innovative and sustainable solutions for cleaner mobility. In addition to (inter)national policies and regulations forcing the industry to change its direction, consumers preferences are also pushing the automotive industry to come up with more sustainable mobility alternatives (Lieven, 2015). In some countries this has already led to a clear increase in the rate of transition towards electric vehicles. However, electric mobility is not an end itself, but is regarded as part of the higher aim of sustainable mobility. This higher aim of sustainable mobility presents itself through the development of game-changing business models and concepts within mobility to better fit (a) regulatory and policy requirements as well as (b) shifting individual mobility needs.

Electric Mobility and Government Policies

Although electric vehicles (EV) are regarded as being highly innovative, the technology in itself has been around for much longer. The first electric car was developed as early as 1834. Until the end of the 19th century, manufacturers in America as well as in Europe produced thousands of cars powered by an electric motor (Chan, 2002). However, from around 1910, the internal combustion engine became dominant as the size and costs decreased whilst range, performance and reliability increased.

During the 20th century, car travel made huge leaps and internal combustion engine vehicles (ICEV) became the dominant method for individual transport. The huge popularity of cars became a central factor in infrastructure planning and design for cities. Officials involved in such planning operations faced an extensive set of considerations and challenges, not only in building an efficient road network but also, among others, ensuring that there was sufficient space for cars to be parked and that there were enough, easily accessible, gas stations (Grübler, 1990).

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Since the turn of the millennium, increased environmental awareness has on the one hand changed the public opinion and consumer consciousness, but has also pushed for international agreements concerning the reduction of carbon emissions. Along with growing concerns about fossil fuels running out and the perceived advantages of energy independence, the development of electric vehicles has gained momentum. Rules and regulations have played an essential role in this transition and the Netherlands, one of the pioneering countries in terms of the electrification of road transport, is a good example.

In 2011, the Dutch government set itself the goal of having 20,000 EVs on the road by 2015, 200,000 five years later and to reach 1 million by 2025. To encourage the transition towards EVs, the government created a set of national incentives including tax credits and interest deductions for entrepreneurs (Van den Hoed et al., 2014). Also on a municipal level, cities such as Amsterdam provide additional incentives, such as the opportunity to apply for a free public charging station close to homes or the offices. All of the national and local policies and regulations have been summarized in **Exhibit 3**. Such incentives have definitely had positive effects; by the end of 2013 there were almost 29,000 EVs, therefore the goal for 2015 has already been realized. Consulting firm Roland Berger predicts that this growth rate should persist at a high annual rate, above 30% per year, until at least 2020 (**Exhibit 4**). However, considering that this amount represents just 0.4% of the 7.5 million personal cars and that EV sales for 2013 represented just a share of 1% of total car sales (RVO, 2013), there is still a lot of progress to be made.

In reaction to changing consumer demands and regulatory pressure, large, established automotive corporations such as Mitsubishi, Nissan, Mercedes and Renault have set out clear strategies toward the production of more and more electrified cars. Additionally, these traditional manufacturers are challenged by newcomers and start-ups, most notably Tesla, who is also aiming for a significant share in this new market (Carney, 2013). Furthermore, an increasingly large group of different potential stakeholders are focussing on how to best manage the process of introducing this new technology and replacing ICEVs with EVs as quickly as possible. Central to all of these, EV manufacturers have two issues that are currently holding back large-scale commercialization (Li et al., 2015): (1) range anxiety and (2) higher production costs.

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Regarding range anxiety, the comparatively limited distance that can be driven on a fully charged battery has a number of implications. Firstly, it means that people may not want to adopt EVs as they believe they do not fit their current mobility requirements, and they are not willing to adjust their behaviour. Secondly, they may also be put off by the new way in which an EV is used, having to charge it more frequently and in a different way compared to petrol cars. In line with these charging issues, the investments that are necessary to build an extensive charging infrastructure that removes these anxieties amongst potential EV drivers are tremendous (Beella et al., 2009; Wagner et al., 2013; Wagner et al., 2014; Gonzalez et al., 2014).

With respect to the higher production costs of EV, this is mainly caused by the high prices of batteries and the need to reduce weight of the car, meaning that more expensive material must be used. This results in a higher buying price for consumers, generally 10-20% more than ICE cars, which has an obvious negative effect on sales (Matthies et al., 2010).

New Mobility Concepts

A number of issues influence changing mobility demands. One of these is caused by urban overpopulation and congestion problems. The huge influx of people in urbanized areas can simply not be accompanied by a matched increase in the amount of cars. In the short term, cities that aim at curbing congestion and pollution are limiting the number of cars in cities, for example by occasional restriction (e.g. letting even number plates enter the city on even days and uneven number plates on uneven days) or by increasing the price of parking, or creating car-free zones (Muñuzuri et al., 2005; Tirachini et al., 2014). This means that people are forced to make additional choices concerning whether to use, or even own a car, but are also encouraged to adapt the way in which they commute (Schade, 2014).

"Consultants Roland Berger say the market for car-sharing will grow 30 percent a year and generate revenue of between 3.7 billion euros and 5.6 billion euros ($4.2 billion to $6.3 billion) by 2020."

Second, and also in line with the aforementioned issues, the interaction between mobility and the phenomenon of the shared economy is being welcomed (Söhnschen, 2015). New concepts are emerging and even in the automobile industry, there is increasingly a willingness to move

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away from traditional views of personal car ownership (Katzev, 2003; Banister, 2008; Griskevicius et al., 2010; Fimkom and Müller, 2011).

The new business models emerging attempt to create value from the fact that cars currently sit idle over 90% of the time (Brooks et al., 2001). Examples include ridesharing (blablacar), car sharing (snappcar and car2go), or new models in how a personal car can generate value (Uber). Each of these new business models are generally built upon smart online platforms that make it very easy to connect supply and demand, cover insurance issues, make payments easy and above all make the system as a whole very accessible and easy to use (Hepler, 2015). These business models move away from the production of cars, instead they focus on providing mobility solutions. As **Exhibits 5 and 6** illustrate, these new mobility providers are expected to play a very important role as market drivers for transforming the automobile industry. Furthermore, these new business model rely increasingly on EVs, such as car2go in Amsterdam. In the future, driverless cars, such as prototyped by Google, might boost these business models even more.

Pressure on the Energy Industry

In addition to a transformation in the automobile industry, trends within the energy sector are also contributing to opportunities in this newly emerging industry. First, there is an increasing contribution of renewable energy, for example solar and wind energy. Although this development is very valuable in terms of cutting back on CO_2 emissions, it is also somewhat problematic since renewable sources are a relatively inconsistent and unpredictable source of energy. This makes it difficult to make effective and efficient use of this energy (Dincer, 2000; Scarlat et al., 2015; Reboredo, 2015). Second, in addition to the increasing global demand for energy, the introduction of electric mobility is likely to lead to a surge in demand for electricity, meaning that the suppliers and distributors of electricity may have to adjust their current activities and infrastructure to suit futures scenarios (Richardson, 2013; Tie and Tan, 2013).

To overcome potential problems related to the unpredictability of renewable energy generation and the increased energy demand, solutions focus on two areas in particular: first, it is important to coordinate energy consumption more effectively by making energy consuming devices “smart”, linking them to one another (internet of things). This is referred to as demand

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response (Tie and Tan, 2013). Secondly, the potential benefits of energy storage are gaining increasing attention. When electricity supply is higher than demand, excess electricity can be stored in batteries. Vice versa, when demand is higher than supply, batteries can feed electricity back into the grid to fulfil excess demand. In this way, it is not only possible to better match demand and supply, but it also greatly improves the efficient use of renewable energy (Dunn et al., 2011; Cao and Emadi, 2012; Helms et al., 2016). Moreover, since the popularity of EV is also increasing, the possibility of using these EVs as storage devices when they are idle has gained significant attentions of the past five years (Yilmaz & Krein, 2013). This concept is referred to as vehicle-to-grid (V2G).

Demand Response

At present, it is not yet possible to store energy on a large scale in a cost-effective manner (Ismail et al., 2015). As a result, production and demand of electricity must remain in balance at all times (Helms et al., 2016). Traditionally, utilities have added peaking power plants to increase power generation when demand increases. Demand response works from the other side of the equation – instead of adding more generation to the system; it stimulates energy users to reduce consumption. In this way it provides an opportunity for consumers to play a significant role in the operation of the electric grid by reducing or shifting electricity usage during peak periods in response to time-based rates or other forms of financial incentives (Faria et al., 2013; Peacock and Owens, 2014)

"Demand side response offers an exciting opportunity for the businesses we work with to turn their energy use into an asset and make significant savings," say SmartestEnergy (UK) CEO Robert Groves

Utilities pay for demand response capacity because it is typically cheaper and easier to procure than traditional generation (Siano, 2014). Demand response allows energy users of all kinds to act as "virtual power plants," adding stability to the grid by voluntarily lowering their demand for electricity. Participants in demand response programs get paid for providing demand response capacity. Demand response providers work with commercial, institutional, and industrial businesses to identify ways for their facilities to participate in demand response programs without affecting business operations, comfort, or product quality. Demand response energy reduction measures are customized for each facility and can include turning off lighting, air conditioning, pumps, and other non-essential equipment. In some regions, facilities may participate in demand response

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by switching to backup generation, thereby reducing demand on the grid (Faria et al., 2013; Chai et al., 2014; Siano, 2014).

Vehicle-to-Grid Technology

"The University of Delaware developed the V2G concept in 1997, and has calculated that one EV may potentially generate about $400 to $5,000 a year for its owner, depending on the energy market and the amount of time the vehicle operates in the V2G mode."

Vehicle-to-grid (V2G) technology makes it possible for EVs to charge as well as discharge electricity when connected to a charging station. In this way, EVs can create additional value by balancing the grid and enable a more efficient use of renewable energy (Tuttle & Bladick, 2012; Beessa & Matos, 2011). For the former, V2G can provide short bursts of back-and-forth power to correct imbalances in the electric power grid. For the latter, the technology may also smooth out the fluctuations inherent in renewable energy production such as wind and solar power. Wind generated power production, for example, is often greatest at night, when demand for power is typically low. In our current power grid there is limited capacity for power storage, so any nocturnally generated wind energy above and beyond what's used immediately goes to waste (Diaz-Gonzalez et al., 2012). V2G is an obvious solution, at least in part, for storing that power, and then drawing on the stored electricity during periods of high power demand (Letendre, 2002). This could be provided on an individual basis (vehicle-to-home), to large offices or apartment buildings (vehicle-to-building) or to the community as a whole.

In doing so, V2G provides a number of potential revenue streams that can be exploited. Firstly, grid service could be provided to utilities, be it grid providers or energy suppliers, to ensure smoothness in the grid and to guarantee that demand and supply can be matched without having moments of over- or under capacity. Furthermore, due to the possibility of storing energy and feeding it back, electricity could be bought on the "energy market" when the price is low, stored in the battery, and sold back to the market with a margin when the price rises. (Budde Christensen, 2012)

Due to the fact that V2G is currently still mainly in a conceptual phase, with a few local pilot programmes, premature markets and a lack of regulations; it is currently difficult to capture the value from the technology. However, in the future V2G could make EVs more attractive as the return on investment for these vehicles rises. Potentially, developments in V2G technology

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could therefore increase the rate of adoption of EVs (Guille and Gross, 2009; Egbue and Long, 2012).

All in all, the developments in the automotive industry and those in the energy industry have given rise to new opportunities in which electric vehicles and novel sustainable mobility concepts interact with the ambitions of having a smarter and greener energy system. Not only has this led to new mobility providers entering the markets, and the development of expansive charging infrastructures to provide these EVs with electricity in some urban areas. Additionally, countless new business models are aiming at niche markets that can benefit from synergies at the intersection of both industries. In recent times, some existing companies as well as ambitious start-ups have taken a dive at the fringes of the newly arising industry.

Players in the New Industry

Bram Kip knew that the developments are not only affecting the automobile industry, but evidently also have an effect on related industries. Especially for firms active in energy markets, the transition towards electric mobility and the changing nature of automotive firms represented significant business opportunities. For Cofely it was now important to understand the evolving value chain and the emerging actors in order to understand where it could add value. Bram made an inventory of relevant players and their activities in the Dutch context as well as potential entrants in the Dutch market along the value chain, beginning with electricity production up to new mobility services (see **exhibit 7**).

Eneco

Eneco is a Dutch energy supplier. In **addition** to supplying energy, Eneco has also made a move towards electric mobility and offer charging stations and services for EV users. Since the summer of 2015, Eneco has also introduced SlimLaden (smart charging) as an option for EV users (Eneco, 2015). By signing up for this option, users can download an app and upon connecting their EV to an Eneco charging station, the app asks users when they need their car again and how full their battery must be. Based on this data, the system ensures that the car is charged accordingly, using green energy, at the best possible price.

"Imagine if everyone had sustainable energy at their disposal. Generated at home, by you, together with the rest of the street or neighbourhood. This isn't an unrealistic vision. We know it is possible, and we are working every day on projects that are making our ambitions and those of our customers into a reality."

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Endesa

Endesa is the largest Spanish electric utility company. In Spain, the firm has 10 million customers, with domestic annual generation of over 97,600 GWh from nuclear, fossil-fuelled, hydroelectric, and renewable resource power plants. Internationally, it serves another 10 million customers and provides over 80,100 GWh annually (Endesa, 2015). Since a few years, Endesa has gradually increased its interest in the growing EV market. It is involved in the ELVIRE (Electric Vehicle Communication to Infrastructure, Road Services and Electricity Supply) and G4V (Grid for Vehicles) consortia aimed at developing the necessary technology, solutions and services to enable on-going interaction between drivers, their power suppliers and the smart grid. Since 2013 it has also be involved in the production of charging points, and since 2015 it is developing chargers, necessary for vehicle-2-grid (dis)charging.

Alliander

Alliander is a Dutch grid operator, covering one third of the national grid and controlling about 88,000 kilometres of cables. Through its subsidiaries, such as Liandon and Allego, the company has expanded its activities to cover a broad scope of innovative energy solutions across the value chain (Alliander, 2014). Amongst these new activities and related to electric mobility, Allego now places, maintains and operates charging stations for the public and B2B market in the Netherlands, Germany and Belgium, with a strong European focus. It is strategically positioned as the unifying party in the middle of the energy sector, the automotive industry and the IT services industry.

Better Place

"Installing a grid of switching stations across an entire nation, in order to negate the limits of battery range, was audacious, costly, and more than a little iffy. But the few customers using them say they do work."

Better Place was an Israeli company that was launched in 2007. The founder believed that instead of have charging stations, battery swapping stations in the fashion of petrol stations would be a much more effective way of reducing range anxiety as empty batteries could easily be swapped for fully charged batteries. Despite their ambitious idea and the large investments Better Place received, Better Place went bankrupt in 2012 (Chafkin, 2014; Shamah, 2015).

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Fastned

Fastned focuses solely on commercial fast-charging stations where customers can recharge their batteries in 20 to 30 minutes. These stations look similar to petrol stations and can be found at comparable locations along the highway. Fastned has set itself the goal of launching one station per month and have recently also gained a licence to contribute to the "European corridor" (Fastned, 2014; ANP, 2015). This gives them an exclusive right to build charging stations along Europe's main highways to make travelling between countries more accessible for EVs. As their slogan reads, Fastned wants to offer "Freedom for EV drivers" by removing range anxiety, especially when travelling longer distances.

Cohere

"We believe in a future where fossil fuels are no longer necessary. And that this can be achieved faster than is usually assumed. We see that the challenge is in creating technology people love to use that effectively brings together supply and demand of energy."

Cohere is a start-up that also offers smart charging solutions. However, their approach differs from Eneco as it focuses more on the charging demand of a local fleet of cars (for example in an office parking garage). Depending on the battery levels and mobility needs of each individual EV users, the cohere system determines the timing and the speed at which each EV must charge, at all times in coordination with the electricity needs of the building itself. For large office buildings and intelligent charging system like cohere can save hundreds of Euro's a year by cutting expensive demand peaks (Cohere, 2015).

The New Motion

"The New Motion has a very clear objective. We want everybody in Europe to have the opportunity to choose mobility based on renewable energy. Everything we do is aimed at this goal." -

The New Motion is the market leader in the Netherlands in offering full range charging solutions for electric cars. From the very beginning, The New Motion has been active in the market, fulfilling a pioneering role in the industry by providing innovative products and customized charging solutions for private and lease car drivers at home as well as at the office (The New Motion, n.d.). The integrated solutions offered by The New Motion include the charging station itself, the installation of the charging station as well as an IT system (see **Exhibit 8**). This one stop shop approach makes The New Motion an attractive party for corporate clients who want a large scale, cohesive charging system for its business locations.

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Mitsubishi

Mitsubishi is currently one of the very active manufacturers of electric vehicles. Especially the success of their Outlander PHEV (around €42,000) has given them a firm position within the e-mobility market, as it was one of the early cars that offered customers the advantages of a large, family car as well as the benefits of (plug-in) electric mobility. Furthermore, they complement their Outlander with a compact car called the iMiEV (around €27,000). Mitsubishi has also proven itself as an ambitious party in the field of further developments within the EV landscape, joining various projects linked to smart charging and V2G (Mitsubishi Motors, 2015).

Tesla

Tesla, a pioneer in the field of electric mobility, designs, manufactures and sells EVs, EV powertrain components and battery products. The company was founded in 2003 by a group of engineers in Silicon Valley who wanted to prove that electric cars could be better than gasoline-powered cars.

With Elon Musk as its CEO, Tesla has gained most of it fame with its EVs. To date, the firm has released two versions, a roadster (around €99,000) and a model S (around €71,000), and their third model, the model X (around €90,000) has been presented. Tesla has distinguished itself due to its high level of innovation resulting in better technical specifications that improve the range and performance of its cars. Furthermore, the firm's visionary large-scale production facilities, the so-called gigafactory, will enable it to further cut costs sharply. By 2020, the gigafactory will produce more lithium ion cells than all of the world's combined output in 2013 (Tesla, 2015; Chafkin, 2015). This will also provide the firm with the opportunity to start making profits, which to date has not yet been the case (Tesla, 2015).

In recent years, Tesla has also identified the importance of services in the new e-mobility market. For long distance journeys, Tesla's Supercharger network provides convenient and free access to high speed charging, replenishing half a charge in as little as 20 minutes. Superchargers now connect popular routes in North America, Europe, and Asia Pacific.

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"Tesla's goal is to accelerate the world's transition to electric mobility with a full range of increasingly affordable electric cars. We're catalyzing change in the industry."

Also, in April 2015, Tesla made a remarkable move when it presented the Tesla Powerwall, a battery pack which can be installed at home or in industrial context. The two private customer models included a 7 kWh wall-mounted (€2,600) unit and a 10 kWh unit (€3,100), both offered at a price that undercut the market rate by about 15 -20%. Furthermore, 100 kWh battery blocks for industrial users were also announced (Tesla, 2015; Lynch, 2015). By providing these battery packs, Tesla hopes that consumers will start to understand and appreciate the benefits of battery storage on their energy consumption and savings on their bills. In the future, battery packs may become superfluous as the same job can also be carried out by the batteries in EVs, however, Tesla recognize that people have to be introduced with such technological innovations and believe that this product will make a transition towards vehicle-2-grid smoother.

Car2go

Car2go, a Daimler AG subsidiary, provides shared Smart Fortwo cars in over 30 cities. By registering for Car2go, one can become a member and has access to the shared Smart cars that are spread throughout the city. For a fixed per minute fee, members can make use of any car that is available at that moment. On average, each city has over 400 of these cars, and the exact location of each car can be tracked on an app, making it easy to determine whether there is an available vehicle in the area (Gibbs, 2014). Furthermore, in most cities, Car2go has made arrangements allowing for free parking throughout the whole city. In some cities, including Amsterdam, the car2go vehicles are electric. According to a press release from December 2014, Car2go served one million members and has established itself in 30 cities with 12,500 Smart Fortwos (Car2go, 2014). As **Exhibit 9** illustrates, the innovative concept has realized an impressive growth since it started in 2008.

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Time to Act

Having gathered all this information, now it was time for Bram to develop a business model for Cofely which would fit the competences of Cofely and create a competitive position in the new industry. He was excited, however, he was wondering what his options were, considering all the different players. Also, how could he describe such a business model so that the board would understand how it creates and captures value? Also, what would be an attractive value proposition for consumers? And what were the respective local contingencies that he had to consider? It was an exciting endeavour!

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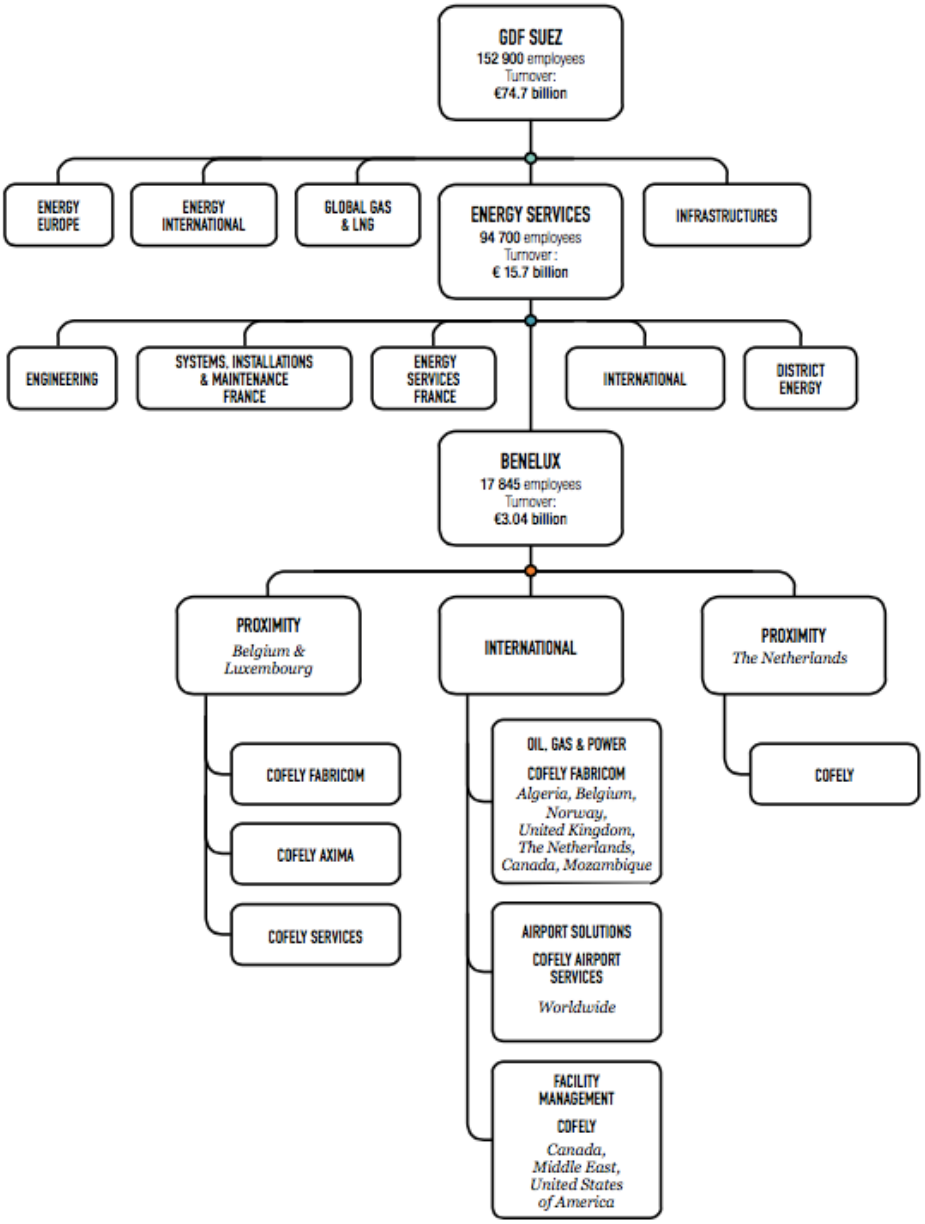
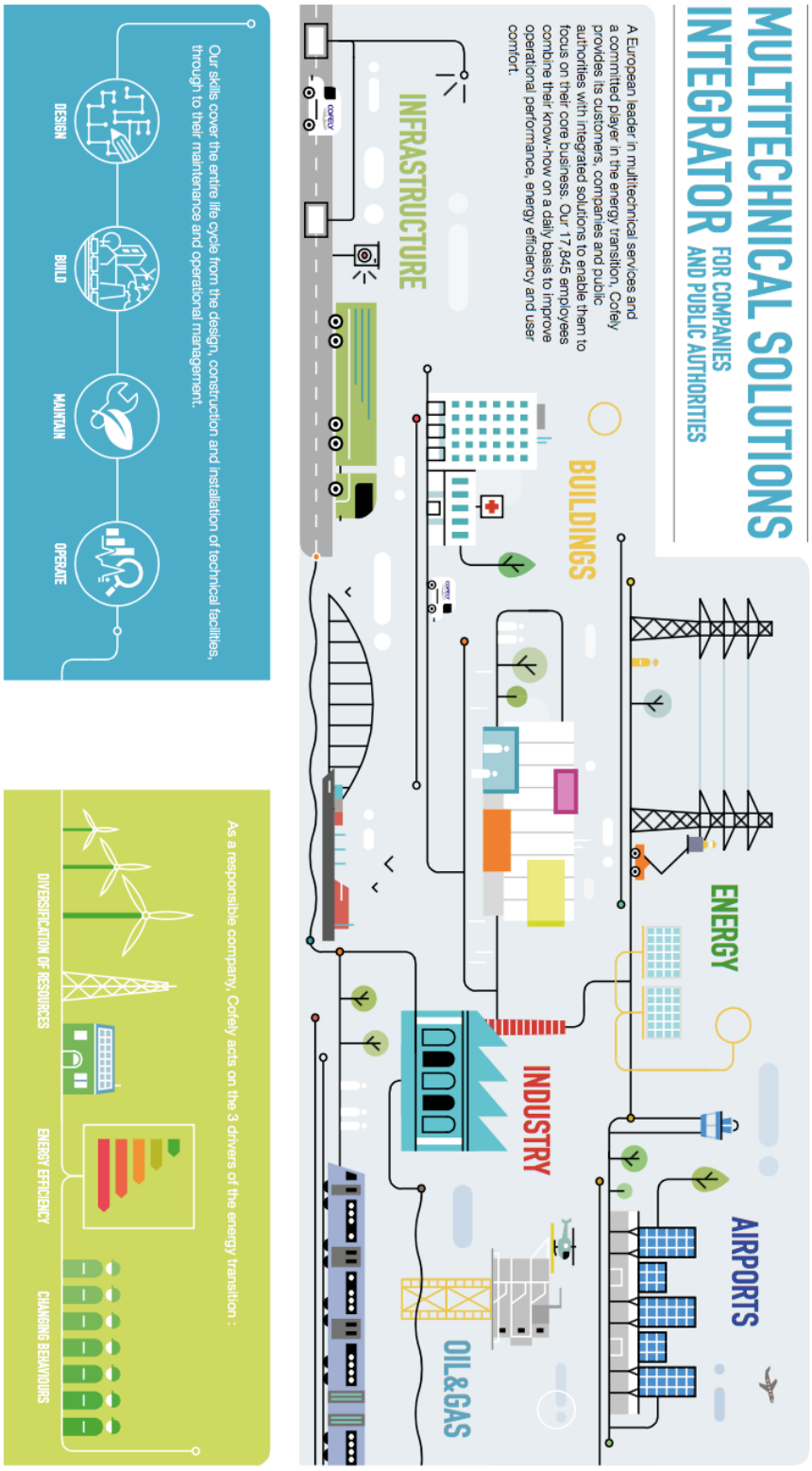
Exhibit 1 - GDF Suez and Cofely business structure



Source: Cofely, Activity & Sustainability Development Report, 2014

Exhibit 2 - Cofely's areas of business and expertise



Source: Cofely, Activity & Sustainability Development Report, 2014

Exhibit 3 - National and local policies and regulations in the Netherlands

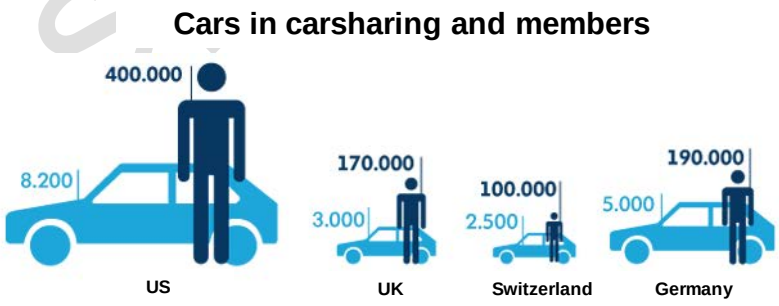
National initiatives	
Road tax (MRB)	All cars with a CO2 output below 50 grams per kilometre are exempted from paying road taxes. This ruling is expected to be dropped at the end of 2015. (ANWB).
Car and motorized vehicle tax (BPM)	The BPM rate that is added to the buying price of vehicles is 0% for (plug-in hybrid) electric vehicles. (Auto&Fiscus)
Additional Fiscal Liability (Bijtelling)	Lease cars that are driven more than 500 kilometres a year for personal use have to pay an additional fiscal charge (Belastingdienst). For full battery electric vehicles this additional charge is 4% of the catalogue price per year. For plug-in hybrids this is 7% whilst all other cars are in the 14% - 25% range depending on their fuel efficiency.
Interest deduction	For entrepreneurs that chose to finance an electric vehicle by means of a lease contract, the interest on the lease is deductible. Additionally, for entrepreneurs that chose to finance electric vehicles themselves, the VAT can be deducted. (Auto&Fiscus, RVO)
MIA (milieu-investeringsaftrek)	MIA offers entrepreneurs up to 36% tax advantages on investments for all cars with CO2 emission below 50 grams per kilometre. For example, for a €35000 EV, the cost advantages from MIA would be 36% on a 25% tax rate: 36% x 25% x 35000 = €3150. This ruling is expected to be dropped at the end of 2014. For plugin vehicles the tax advantage is 27% (Auto&Fiscus)
Formule- E team	An initiative, launched in 2009, aimed at offering a platform to share EV know-how and create a valuable network of individuals and firms involved in EVs.
E-laad foundation	An initiative set up between utilities firms to stimulate electric mobility by collecting and sharing information concerning charging behaviour.

Green Deals	A national initiative aimed at stimulating the use of EVs by sharing information on charging infrastructure between cities, potential business cases and provides the government with a means of introducing EVs for transport in the public sector. Green deals focuses on trying to diminish the individuality of cities and take on a more centrally organized approach.
Low emission Zones	'Milieuzones' in Dutch, are being introduced as an effort to improve air quality in cities. Such environmental zones have been introduced in some of the largest urban areas in the Netherlands (e.g. Amsterdam, The Hague, Leiden, Rotterdam and Utrecht) in order to restrict the entry of vehicles not classified as 'environmentally friendly' (particularly old diesel cars and large trucks). Thus, there are specific entry rules for vehicles on the basis of their emission characteristics.
AMSTERDAM	
Subsidies on EVs/charging poles	Until the end of 2014, the following subsidies apply to electric vehicles: (Amsterdam Elektrisch) • €5000 for personal electric cars (zakelijk veelrijder) • €5000 for electric commercial vans • €5000 for electric taxis • €40000 for electric trucks
E-parkeervergunning	**EV users, both personal and commercial, can apply for a special parking permit. This allows these users to skip the long waiting periods for parking permits in Amsterdam. (Amsterdam Elektrisch)**

Exhibit 4 - EV battery market forecast (million kW)

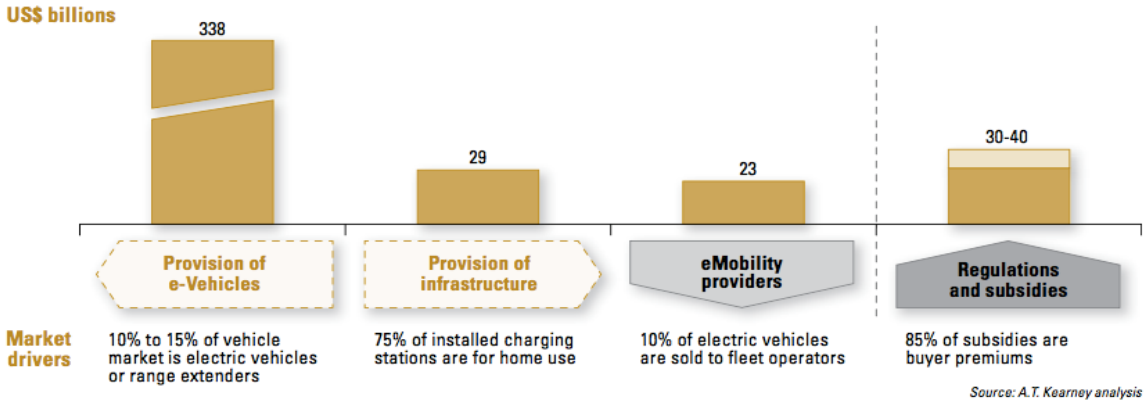
Source: Roland Berger, E-mobility: A promising field for the future, 2011

Exhibit 5 - Carsharing market: cars and members



Source: Frost & Sullivan, 2010

Exhibit 6 - e-Mobility providers are important market drivers for EV transition



Source: A.T. Kearney, eMobility: The Long Road to a Billion-Dollar Business, 2011

Exhibit 7 - The Value Chain and some of the Actors within the New Industry

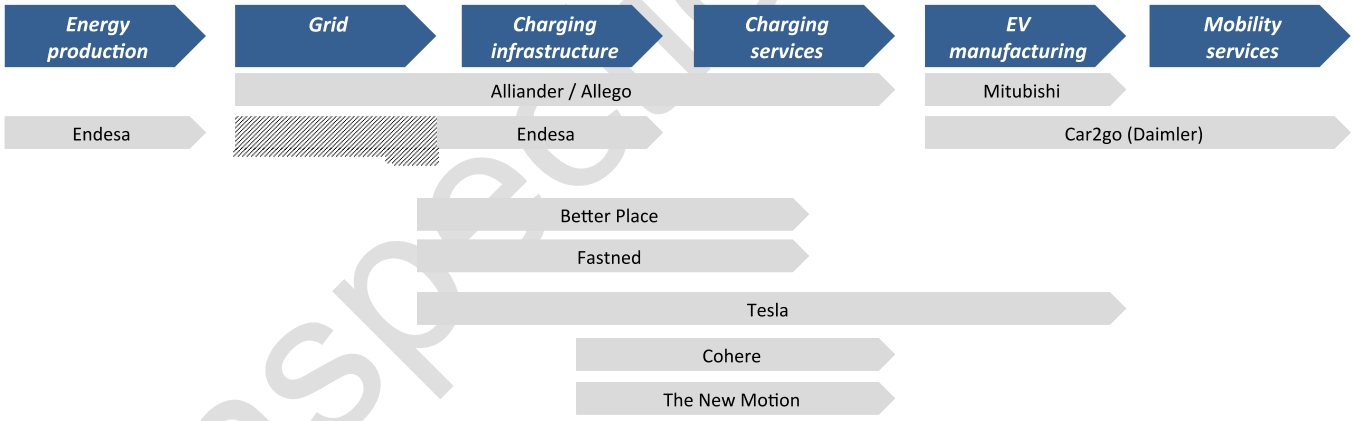


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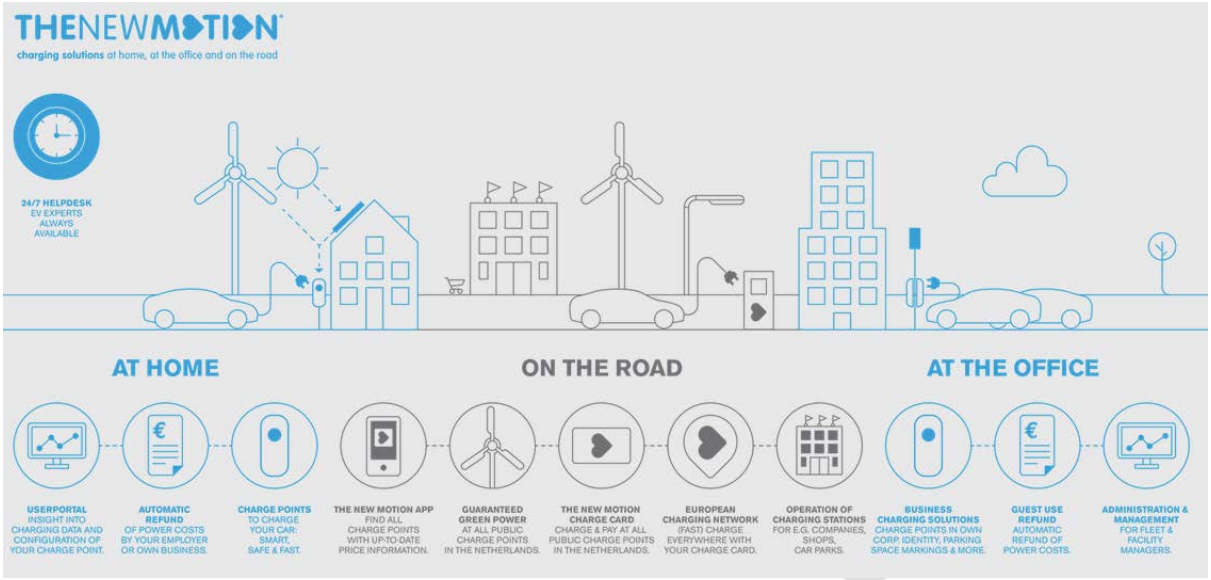
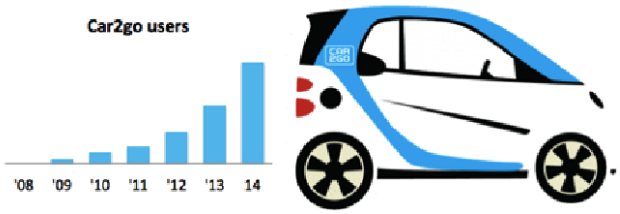
Exhibit 8 – The New Motion total charging solutions



Source: http://www.thenewmotion.com/en/about-us/, last accessed February, 11 2016.

Exhibit 9 - Growth of Car2go users between 2008 - 2014



Source: Car2Go, 2014

Inspiration

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