



THE PRINCE OF WALES'S
CORPORATE LEADERS GROUP

Business
conversation

The energy transition in Central and Eastern Europe:

The business case for
higher ambition



UNIVERSITY OF
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The Prince of Wales's Corporate Leaders Group

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Executive summary

The transition towards a zero carbon economy provides Central and Eastern Europe (CEE) with significant opportunities to deliver better public health, improved quality of life and economic prosperity, as well as positive climate outcomes. Deploying low carbon, resource efficient energy solutions can deliver growth, jobs and competitive advantage.

CEE countries might be newer member states of the EU, but they follow the same market trends and legal obligations as older member states. This provides both challenges and opportunities. As late adapters, the pace of the transition in the CEE region lags behind Western Europe. However, late adaptation provides **opportunities for market expansion using the most recent, innovative and cost-effective technologies.**

Despite the achievements to date and the vast potential in the region, CEE countries face significant challenges from political constraints to decision-making, a volatile legal environment and the lack of skilled labour. If these constraints can be addressed there are **great economic and investment opportunities in the CEE region.** By seizing these opportunities, the CEE countries may also experience other benefits that improve overall quality of life.

This business conversation paper explores the emerging opportunities and challenges relating to the ongoing energy transition in three core areas:

1. Energy efficiency in buildings

Renovation rates differ significantly across the CEE region. In those countries with lower renovation rates and colder climates there is a **high untapped potential for large-scale energy efficiency improvements.** Throughout CEE countries, relaxed planning regulations and limited enforcement of technical standards has resulted in renovations being undertaken by unqualified persons, leading to incomplete renovation solutions.

The characteristics of the residential building stock in many countries (with a high proportion of Soviet-era multi-unit buildings) make it **highly suitable for standardised energy efficiency solutions.** The high levels of private ownership, including among poorer households, however, present challenges to widespread implementation of these solutions.

2. Renewable energy

The natural potential for renewable energy generation in the CEE region is high (including solar, wind, hydro and geothermal sources). However, much of the renewable generation potential is currently underutilised due to the protection of traditional fossil fuel industries, insufficient investment in the energy infrastructure and other considerations (such as commitment to new developments of nuclear power plants). Nevertheless, **investment in renewables is expected to increase** due to the consistent downward trend of costs and ambitious EU targets

for the post-2020 period. This process is expected to be further accelerated by a growing awareness of climate change and the leadership of transnational companies that are aiming to power their operations on renewables.

3. Mobility

The region has a **comparative advantage of extensive public transportation** inherited from the socialist era and a broad interest and support for innovation. This could form the basis for future mobility services that incorporate shared solutions, invest more efficiently in improved infrastructure for mass transit and allow for smart mobility solutions. There is also strong interest in new innovations, including electric vehicles. However, uptake of such new technologies is restricted by lower purchasing power in CEE countries. Relatively older vehicle fleets increase **the risk of the region becoming a depository for highly polluting vehicles from Western European countries** as they implement bans on the sale of internal combustion engine and diesel cars.

Recommendations

For the economic opportunities to be fully realised, this business conversation paper recommends companies active in the region to:

- offer new financial products and services that reduce the cost barrier
- bring to market new products and technological solutions
- take the lead by decarbonising their own operations

It recommends governments:

- examine the significant economic opportunities, consult with business, support training initiatives and adopt a holistic approach when finalising their National Energy and Climate Plans
- provide a stable and reliable regulatory environment that is attractive to long-term investors
- ensure public investments are consistent with future trends and private sector solutions
- plan for the future of their economy in a way that is inclusive and takes into account the wellbeing of all citizens.

Finally, it recommends the EU provides funding to support the energy transition in EU Member States to address the current bottlenecks and support investment.

The Prince of Wales's Corporate Leaders Group (CLG) will continue to increase its engagement with businesses and policy makers in the CEE region in line with these aims.

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Contents

Introduction	1
Section 1 - Background to the region	2
The role of the EU and Russia	
Economic development	
Demographics	
Energy and climate change policy	
Section 2 - Energy efficiency in buildings	5
What is the overall context?	
How does CEE compare to other EU countries?	
Regulation	
Financing	
What is the market potential for energy efficient interventions in the residential building sector?	
What is the potential for non-residential buildings?	
Skills in the workforce	
Section 3 - Renewable energy	11
What is the overall context?	
Renewable energy targets	
What is the potential for wind and solar in the region?	
What is the potential for other renewable energy sources?	
The development of micro-grids, smart systems and energy storage	
What challenges slow this transition?	
How are business consumers responding?	
Section 4 - Mobility	17
What is the demand for mobility in CEE countries?	
E-mobility is making a breakthrough	
What are the future trends?	
Conclusions and recommendations	22
References and endnotes	23

Introduction

There are significant opportunities for the zero carbon energy transition in Central and Eastern Europe (CEE) countries that can lead to growth, competitive advantage and cost savings, as well as helping to meet environmental and social goals.

This report explores the emerging economic opportunities and challenges relating to the transition to low carbon, resource efficient economies in three core areas:

1. Energy efficiency in buildings
2. Renewable energy
3. Mobility services

Not only do these sectors cover a significant proportion of the low carbon energy transition but they are also areas in which The Prince of Wales's Corporate Leaders Group (CLG) has built up expertise in Europe. Indeed, this is the fifth instalment of our business conversation series with the aim of stimulating policy debate and leading positive change among politicians, policymakers and businesses, all of whom have a pivotal role to play in accelerating the energy transition in Europe. The series is based on desk research and interviews with businesses, and previous reports examined:

- the role of renewables in Europe (April 2017)¹
- new models for resource productivity for European industry (September 2017)²
- the future of road transport in Europe (November 2017)³
- renovation with the aim to make Europe's homes fit for the 21st century (April 2018).⁴

For this report, the CLG's focus is on the CEE region as there is less knowledge of the opportunities and challenges associated with the low carbon energy transition in CEE countries as compared to Western Europe. The report is based on desk research and interviews with 20 companies and organisations – including two CLG member companies (Tesco and Signify) – that are operating in CEE. Although some interviewees are representative of the business sector, others are specialists in the energy efficiency renovation of buildings, renewable energy generation and/or mobility.

The report examines the context of the region's historical heritage and current social, political and economic factors, drawing on inspiring examples of business innovation that are showing what is possible. It offers recommendations for both business and policymakers, highlighting how both sets of actors can support and benefit from the energy transition.



Tram passing by a bike sharing docking station in Timisoara, Romania (credit: Antal Gertheis, Mobilissimus)

Section 1

Background to the region

The term ‘CEE region’ is often used to refer collectively to countries that belonged to the Eastern Bloc after the Second World War, many of which gained independence following the breakup of the Soviet Union in the late 20th century. The CEE countries are former Warsaw Pact members, and today most are members or allies of the EU and/or NATO.⁵

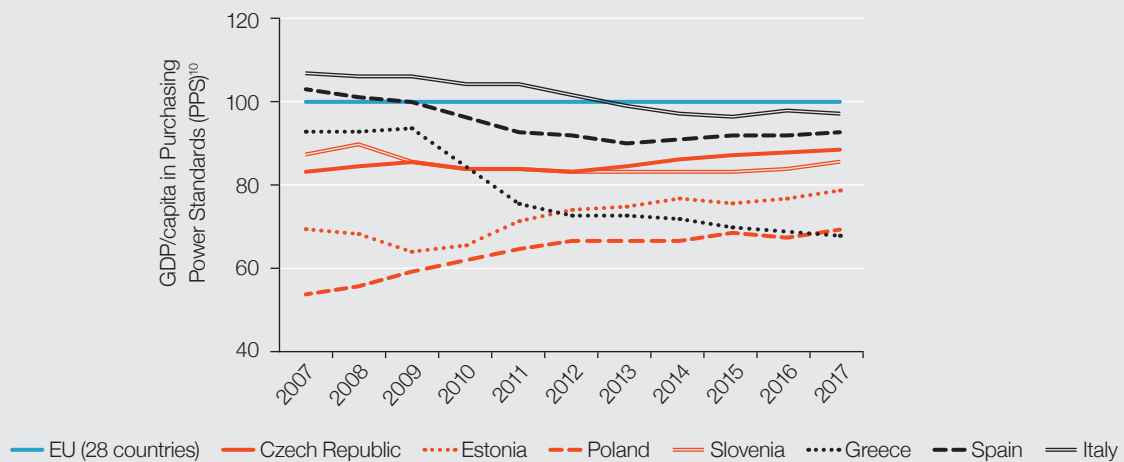
The role of the EU and Russia

The focus for this report is only on CEE countries that are currently EU members (see Figure 1), omitting aspiring members of the EU (such as the countries in the Western Balkans) and countries further afield (such as Georgia or Belarus).⁶ EU membership provides a general regulatory framework and the prevalence of the rule of law, both of which help to underpin safe investments.

It is important to note that Russian influence continues to be strongly felt throughout the CEE region. For example, Russia’s targeted energy politics have impacted on regional energy policy, most notably in the form of gas imports and planned construction of nuclear power plants. The CEE region also serves as an intermediary through which Russia distributes its fossil fuels to Western Europe.

Figure 1. Map of the CEE countries that are currently members of the European Union



Figure 2. Economic convergence of selected CEE countries

Source: Eurostat 2017

Economic development

The political upheaval following the breakdown of the Soviet Union in the late 1980s and early 1990s led to a drastic collapse of CEE economies. This was followed by a high rate of economic growth from the middle to late 1990s and into the 2000s.

Membership of the EU was a significant factor in economic recovery. The CEE countries entered the EU in three waves: 2004, 2007 and in 2013. For most CEE countries, EU membership offered new opportunities to bridge the gap economically with their Western neighbours, and financial support from the EU facilitated unprecedented economic development.

Economic growth has not been evenly spread across the region and there has been significant divergence between CEE countries. For example, some countries were able to utilise EU funds to

boost sustainable economic growth more effectively than others. Furthermore, the impacts of the global financial crisis in 2007–08 were more severely felt in some countries relative to others. While Hungary and the Baltic states were hit hard,⁷ the Polish economy was barely affected.⁸ The transition from communism to a market economy also contributed to increased economic and social inequality within CEE countries, affecting the Roma population in particular.⁹

Today, the economies of the most developed CEE countries (namely the Czech Republic and Slovenia) have nearly caught up with a number of Southern EU economies (such as Italy and Spain) as measured by GDP per capita. Countries such as Poland and Estonia are not far behind and have been closing the gap over the last decade.

Demographics

Many of the formerly socialist countries in the CEE region face demographic challenges that set them on a different population trajectory from the rest of the EU. Existing demographic disparities between CEE countries and other EU regions are forecast to be further accentuated by:

- **Lower life expectancy** (for both sexes) compared to elsewhere in the EU, despite a sudden increase after the collapse of communism. These differences are expected to persevere, at least in the short term.
- **Low fertility rates and high out-migration**, which contribute to population decline and more rapidly ageing societies.¹¹
- **A high old age dependency ratio**, which indicates the number of active people supporting the retired population.¹² This is expected to increase further in CEE countries in the coming decades.



Energy and climate change policy

The high rate of economic growth in the late 1990s in the region was not accompanied by significant improvements to the energy efficiency of the production processes, and CEE countries continue to be characterised by energy inefficient industries. It takes nearly three times more energy to produce one unit of GDP in the Czech Republic than in Austria,¹³ with severe implications on air quality and health. According to the World Health Organization (WHO), 36 out of the 50 most polluted cities in the EU are in Poland, largely as a result of the widespread use of coal and old boilers. Even today, 70 per cent of single-family buildings in Poland use coal for heating.¹⁴

A combination of high per capita energy demand and the relative poverty of the older age groups can put pressure on governments to find ways to decrease energy prices and/or increase energy production. Alternatively, it may incentivise stakeholders to reduce demand through energy efficiency improvements.

In most CEE countries, the ability to keep household energy prices low plays a central role in gaining political power.¹⁵ Politicians and the incumbent energy companies have successfully dominated the public discourse. As such, the commonly held (if questionable) view is that local fossil fuel and conventional energy production will guarantee cheap energy for households, and renewable energy is significantly more expensive.

Securing safe supply of energy requires overcapacity, huge reserves and/or a good relationship with Russia, as the historic energy provider of the region. As a result of this, CEE countries have set comparatively low targets for both energy efficiency and renewable energy.¹⁶ These are well below the physical and economic potential of the available technologies. Climate change adaptation policies also lag behind the rest of Europe.¹⁷

While the population in the CEE region is largely aware of climate change and its effects, air quality¹⁸ receives more attention due to widespread and immediate health concerns. The public pressure on governments is focused on measures to improve air quality, rather than action on climate change, resulting in relatively low levels of climate ambition in most CEE countries in comparison to other EU countries.



Palace of Culture and Science in the smog, Warsaw, Poland
(credit: Henrique Xavie, Unsplash)

Companies taking a holistic approach to improve policy in Slovenia¹⁹

The Center of Energy Efficient Solutions in Slovenia is an umbrella organisation that incorporates national and international companies of all sizes with a direct interest in the energy efficiency market and accelerating the growth of the green economy. The Center deals with energy efficiency in the holistic sense, integrating issues on energy efficiency in the building sector, environmentally friendly energy generation and mobility.

The Center organises monthly sessions on each of its themes and hosts cross-sectoral meetings on the latest developments. The main task of the Center is communication with policymakers, and it intends to amplify the voice of its member companies. It provides background

information to initiate legislative changes, carries out studies and surveys to inform national-level decisions and provides guidance support for different target groups (both residents and companies) in carrying out energy efficient interventions.

Even though the member companies might have conflicting interests in their competing activities in the short run, they have common overall interests in shaping the market in the long run.

Section 2

Energy efficiency in buildings

Buildings are responsible for approximately 40 per cent of final energy consumption and 36 per cent of CO₂ emissions in the EU.²⁰ In seven out of the 11 CEE countries, the building sector accounts for a bigger share of total energy use than the European average, reaching 50 per cent in Estonia, Latvia and Hungary.²¹ Thus, energy efficiency interventions in the building stock in these seven countries could result in proportionally greater benefits than elsewhere in Europe.

What is the overall context?

The current building stock in CEE countries can generally be characterised as having comparatively high rates of private ownership, low rates of social rental housing and varied rates of multi-unit residential buildings.

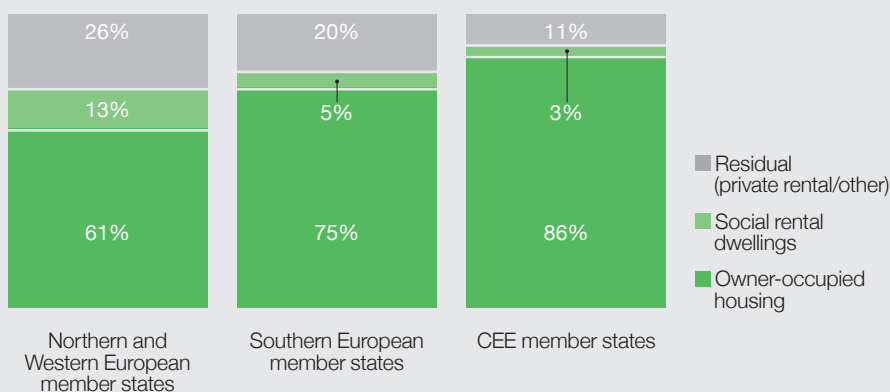
1. High ownership

The privatisation in the housing sector in the 1990s has had profound consequences in most CEE countries in terms of housing policy,²² urban development²³ and the effectiveness of energy efficiency policies. The mass transfer of the formerly state-owned stock to the sitting tenants at a give-away price created an army of poor homeowners, while social rental housing virtually disappeared.

2. Low social rental housing

Even today, the CEE region has the lowest rate of social rental dwellings in Europe and a poorly regulated private rental sector, making it hard for young adults to leave home and resulting in high rates of overcrowding. The lack of social rented housing means that regulation cannot be used as effectively as in countries with large social rented housing sectors (such as obligations for housing providers to improve energy efficiency). At the same time, many owner-occupiers lack the necessary financial resources to improve the energy efficiency of their homes, resulting in a high reliance on subsidies.

Figure 3. Tenure structure of the housing stock in three main regions of Europe (2016)



Source: Hegedüs, J., Somogyi, E., & Teller, N., 2018.

The rate of overcrowded housing in Central and Eastern Europe is nearly **5 times higher** than in Northern and Western EU Member States



3. Multi-unit residential buildings

There are significant variations in dwelling types across the CEE region. The share of multi-unit buildings based on floor area ranges from 74 per cent in Latvia to 24 per cent in Slovenia.²⁴ While a high rate of home ownership eliminates the complications caused by split incentives that affect private rental housing,²⁵ the ownership structure of larger multi-unit residential buildings makes renovation decisions difficult to reach (as in most cases at least

the majority of owners must agree on the renovation works). In many cases, owners with low or modest incomes strongly oppose deeper renovations due to financing difficulties. Many households in the CEE region would benefit significantly from energy efficiency measures but lack the upfront funds to finance such interventions. These financial difficulties make the CEE market much more price sensitive than Western Europe.

How does CEE compare to other EU countries?

The energy efficiency of residential buildings in the CEE region is broadly similar to other EU member states when compared with countries with a similar climate. This is demonstrated in Table 1 by the amount of energy used for heating one square metre of space

and the building thermal efficiency standards (displayed as the U-value²⁶ of the building shell, where a low U-value indicates a high level of insulation).

Table 1. Basic technical parameters of energy use and efficiency in the building stock (2014)²⁴

	CEE EU member states	Average energy consumption for space heating in the residential sector(kWh/m ² /yr)	Weighted average of U-values for building shells*
Mediterranean	Bulgaria	91	1.35
	Greece	129	2.15
Eastern-continental	Czech Republic	168	1.25
	Germany	165	1.14
Nordic climate	Estonia	192	0.58
	Finland	205	0.75

* U-values are related to the time of construction²⁷

The building stock in CEE is relatively young (built mainly after 1946),²⁸ meaning that a smaller proportion of the stock is subject to special requirements for historical buildings. Also, a high share of the building stock (both residential and public) is built with industrialised/prefabricated technology,²⁹ making it suitable for energy efficiency renovation using standardised solutions.

The annual renovation rate of residential buildings varies significantly among CEE countries. In 2012, 1.18 per cent of the housing stock in the Czech Republic underwent major renovation, compared to only 0.12 per cent in Poland in 2013.³¹ Equivalent rates are over 2 per cent in France and 1 per cent in the Netherlands.

Subsidy schemes have helped to promote public awareness of energy efficiency in some CEE countries, increasing the renovation

rate. In Slovakia, which adopted in the late 90s a systemic approach to building renovation (including subsidies), “more than 58 per cent of multi-apartment buildings and 37.5 per cent of single-family buildings had been renovated” by the end of 2016. However, this figure includes buildings where only partial renovation has been carried out.³²

When analysing these figures, there are concerns regarding the depth and quality of interventions and whether past interventions would be considered obsolete by current standards. Nevertheless, **some countries in the region have made significant progress in terms of energy efficiency.** These tend to be countries where subsidy schemes have been in place for a prolonged period.

Approximately **25 per cent of Hungarian households** are planning to carry out one or various energy efficiency **refurbishments** in their homes within the next five years, worth around **HUF 1,300 billion (EUR 4,060 million)**. The market potential breaks down as:

37%

thermal insulation



23%

replacement of windows



13%

more efficient heating and hot water systems



27%

instalment of Renewable Energy Systems (RES).³⁰



Regulation

Much of the building quality and energy efficiency legislation in the CEE countries originate from EU-wide legislation. This includes directives on the compulsory renovation rate of public buildings, energy performance certification, energy obligation schemes and the construction of nearly zero energy (nZEB) buildings. Although the EU defines technical standards for the cost-optimal levels of interventions (in the case of major renovation and new construction), member states can exercise some autonomy over the technical specifics and procedures. As a result, the requirements for new constructions and renovations of buildings vary between CEE countries. Most CEE national standards are close to those of other EU member states, although Slovakia has adopted the strictest standards in Europe.³³

In most CEE countries, most renovation works do not require formal permits, and legal requirements that do exist are often not enforced. **Self-implementation of construction and renovation works is common.** According to the 'Chance for Buildings' survey in the Czech Republic, only about 30–35 per cent of the renovations are implemented by skilled building professionals.³⁴ While self-implementation can make housing renovations more affordable, there is often weak implementation of regulatory standards. In some CEE countries, high VAT on renovation (for example, 27 per cent in Hungary, 25 per cent in Croatia, 21 per cent in Lithuania and Latvia, 20 per cent in Bulgaria, Estonia and Slovakia)³⁵ incentivises self-implementation and black-market contracting – leading to the further growth of the informal economy in the construction sector.

National-level regulations do play an important role in boosting energy efficiency upgrades in private sector non-residential buildings (such as commercial, industrial and office buildings). However, businesses typically make decisions regarding renovations and improvements on strict financial criteria. As a result, they are only likely to invest in energy efficiency improvements that have a short payback period, such as energy

Certification system strengthens energy efficiency for office buildings

Various types of green certification for office buildings are in operation in the CEE region (such as LEED and BREEAM) and an increasing share of new office buildings obtain these certifications. Some countries have policies in place to incentivise companies to acquire green certificates. For example, in four cities in Romania, offices with a green certification may be eligible for a local tax deduction.³⁶

efficient storage systems or heating systems. Consequently, strict standards and regulations can help foster private sector energy efficiency investment.

During the past few years, the renovation rate has increased for public sector buildings as a result of EU regulation.³⁷ Consequently, government buildings are being renovated at a higher rate than residential buildings. This affects the use of EU funding for energy efficiency. In the 2014–20 budgetary period, the amount of EU funding allocated to energy efficiency improvements in public sector buildings exceeded the amount allocated to the residential sector in many CEE countries, including Slovakia, Poland, Romania and Slovenia.³⁸

In June 2018, the amended Energy Performance of Buildings Directive³⁹ was published. The revised provisions entered into force in July 2018 and the member states have 20 months to transpose the directive into national legislation. This directive will further incorporate into regulation key building features like indoor air quality and ventilation, and will encourage more technical solutions that provide holistic responses to the quality of the living environment.

Case study

The potential for ESCO (energy service companies) solutions

Energy Service Company (ESCO) solutions are implemented mostly in connection with the public and commercial building stock in CEE countries. ESCO companies traditionally prefer interventions with a short payback period – such as lighting and heating system upgrades – but recently ESCOs have also been entering into longer duration projects, including insulation. As some of the barriers in connection with ESCO structures have been removed in the EU (such as the assumption that ESCO interventions must be accounted as public debt in the public sector) a growing dynamism is expected in this field. However, despite the strong desire for them to do so, it is important to note that ESCO companies prefer contracts with singular entities (like municipalities or state organisations), making it unlikely for them to become key players in the financing of residential sector renovations in the near future.



ESCOs should not only be considered as financial and technical tools but also as tools for the implementation of holistic projects that may contain climate friendly energy generation and energy efficient retrofitting at the same time.³⁴

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Financing

Subsidies for the energy efficient renovation of residential buildings have been available in most countries of the CEE region for the best part of the last two decades. Some countries introduced them in the late 1990s and early 2000s (for example in Hungary, Poland, Slovakia and the Czech Republic), while others joined later (such as Lithuania in 2005, Romania in 2009, Estonia in 2010, Croatia in 2014 and Latvia in 2016). These subsidies were initially funded from national sources combined with revenue from emissions trading. However, from the early 2010s, European funding has become the main source of nearly all such subsidy schemes. At the same time, subsidy schemes were extended to non-residential buildings.

The high reliance on EU funding for energy efficiency subsidy schemes in the CEE region is problematic for two reasons. Firstly, the amount of funding made available for energy efficiency schemes may change substantially in the 2020–27 period. Despite the widespread assumption that the need for energy efficiency interventions remains high, the amount of money coming from the EU may decrease as a result of the United Kingdom leaving the EU and changing perceptions of the degree of underdevelopment in the CEE region. The nature of the funding may also change, with loans replacing grants. Secondly, effective utilisations of EU funds can be slow. The use of funds in the 2014–20 budgetary period

did not start until 2016–17. At the moment, there is expected to be a gap of EU funds between 2020 and 2023.

The volatility and uncertainty of subsidy schemes undermines their effective utilisation. The amount of money devoted to subsidies, the eligibility criteria, the subsidy rate and the form of subsidy are modified every few years in most countries, making it difficult for households to plan ahead. For example, approximately 58 per cent of households living in single-family homes in the Czech Republic implemented some kind of energy efficiency interventions during the five-year period leading up to 2016, but only 6 per cent of them used a subsidy.⁴⁰ In an inelastic, fragmented market, subsidy schemes can also increase construction prices and require additional administration in order to secure national funds. However, subsidy schemes can be useful in helping to improve the public's awareness of energy efficiency interventions and in encouraging banks to develop competitive products to co-finance subsidies, many of which may become stand-alone products in the long run.

If the gap in EU funding availability materialises, new financial instruments are likely to be needed to prevent a dramatic fall in the rate of energy efficiency renovations.

What is the market potential for energy efficient interventions in the residential building sector?

In residential buildings, most energy is used for heating (such as 71.3 per cent in Poland and 55–80 per cent in Romania – depending on the type of building).⁴¹ This highlights the important role of insulation in energy efficiency renovation. Subsequently, the market for energy efficiency interventions in the building sector is quite competitive in the CEE region as far as traditional interventions are concerned (for example, insulation, window replacement and modernising heating systems).

The market potential of energy efficient renovations in CEE is comparable to that of the other EU countries with similar climatic conditions as the technical parameters of residential buildings have similar characteristics. However, **the potential offered by new construction is significantly greater in CEE**

than in most other EU countries.⁴² This is because of high rates of overcrowding and large household size, in comparison to the rest of the EU,⁴³ mean that dynamic growth in new construction can be expected in the long run, especially if economic growth in the CEE region continues.

National policies have traditionally favoured simplified technical solutions which are more likely to appeal to residents with lower income. To date, most residential sector energy efficiency schemes have concentrated on energy savings alone and do not consider other aspects of quality of life like comfortable indoor temperature, indoor air quality or fire protection. This has prompted criticism from some actors in the sector.

Renovated private housing in Budapest, Hungary (credit: András Ekés)



However, there are signs of a shift towards a more comprehensive approach. For example, the ‘State Housing Policy Concept up to 2020’ in Slovakia may open up a scalable market for complex interventions, which consider energy efficiency not only from a cost and energy point of view, but also as a factor for increasing quality of life (including proper lighting and a healthier indoor climate).

The Slovakian approach reflects the sentiment that energy efficiency may not be regarded as the most important consideration influencing building renovation decisions. Structural or operational factors can often predominate over energy cost-saving considerations. This becomes apparent in the case of replacing windows, which is a common intervention in multi-unit buildings, even in cases when individual heating consumption is not metered. According to the *Healthy Homes Barometer* by VELUX in 2017,⁴⁴ energy efficiency, comfort and health reasons were of equal importance in residential renovation decisions in Europe, including the CEE region. Where energy efficient interventions have long payback periods, additional stimuli besides energy savings are required for market development.

What is the potential for non-residential buildings?

Non-residential buildings are better suited for interventions in the fields of lighting and electronic appliances than residential buildings. The energy-saving potential of non-residential buildings differs from residential buildings due to the structure of the energy consumed. In non-residential buildings, a lower share of energy is spent on heating than on lighting and electrical appliances combined (for example, in Poland, 37 per cent of energy is spent on heating, ventilation and air-conditioning, 32 per cent on lighting and 24 per cent on appliances).⁴¹ As a result, non-residential buildings are better suited for interventions in the field of lighting and electronic appliances than residential buildings. Some of the recent

Introducing new lighting systems in industrial and office buildings in Poland

Signify (previously Philips Lighting) introduced a new lighting system in the Spark office complex in Warsaw based on an intensive consultation with employees. The new lighting system resulted in significant savings in energy costs and a better work environment (for example, using cooler white light to boost concentration in the morning and shifting towards a warmer white light when getting closer to the end of the working day). The control of lighting can be implemented by an application that is integrated into other facility management services (such as heating and occupying parking places).⁴⁶

Signify also modernised its own factory in Pila by installing new LED lighting infrastructure. This improvement resulted in 42 per cent less energy used while also improving working conditions for the employees.⁴⁷

Both these examples demonstrate that there is market demand for improvement in lighting services, not only regarding the energy saved but also in terms of creating a better quality working environment.

technological solutions to improve energy efficiency can also result in significant improvements to indoor air quality, comfort and productivity. These are important considerations, particularly for office buildings.



Újhegy housing estate, Budapest, Hungary (credit: Éva Gerőházi)

Skills in the workforce

Shortages of skilled labour present challenges to energy efficiency improvements. This problem is most severe in the CEE countries with the highest net out-migration (such as Romania, Bulgaria and Baltic countries), but also affects countries with a more stable population (such as the Czech Republic). According to a recent survey,⁴⁸ **Hungarian companies working in the field of energy efficiency ranked the shortage of skilled labour force as the greatest barrier to increased investment in energy efficiency**, followed by the volatility of the legal background and the uncertainties of political decisions.

A shortage of workers, especially appropriately skilled workers, can lower the incentive among construction workers to acquire new qualifications, as demand for workers already exceeds supply. This problem may further increase with the introduction of nZEB obligations in new construction. As Slovak experts emphasise: “It is estimated that at least 40 per cent of building construction workers will need to undergo training, take a course or otherwise improve their skills in the next few years.”³²

Corporate strategies to educate the market

VELUX in the Czech Republic works on three levels to increase the skills of the workforce by:

1. cooperating with local governments in vocational training
2. organising events and competitions for students to promote the idea that “hand work” pays off
3. conducting specialised windows installation training programmes for construction sector employees.

ROCKWOOL defines different target groups for information provision:

1. For more simple applications, it provides web-based tutorials and guidelines for self-builders and construction groups.
2. For more complex solutions, groups of trainers travel to different countries and provide instructions on how to install its products.

“

We have to go beyond energy efficiency. We need safer, healthier and higher quality buildings, having a good environmental impact and their own solar energy production.³⁶

Mihai Toader-Pasti,
General Manager,
EFdeN, Romania

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The awareness on climate change does influence the depth of interventions rather than the quantity of buildings being renovated. For example, the installation of green roofs, water retention systems and built shadings is becoming more common.³³

Peter Robl,
Public Affairs Manager,
Knauf Insulation, Slovakia

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Emotional factors are more important in the renovation of residential buildings than rational argumentations. The ones that took rational arguments into account have already insulated their buildings in the Baltics. Others look at the patterns of their neighbours more.⁴⁵

Selina Vancane,
CEE Bankwatch Network,
Latvia

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Section 3

Renewable energy

The rapid expansion in the market for renewable technologies globally over the last decade (particularly in solar and wind technologies) has created new, economically viable opportunities which the CEE region can capitalise on.

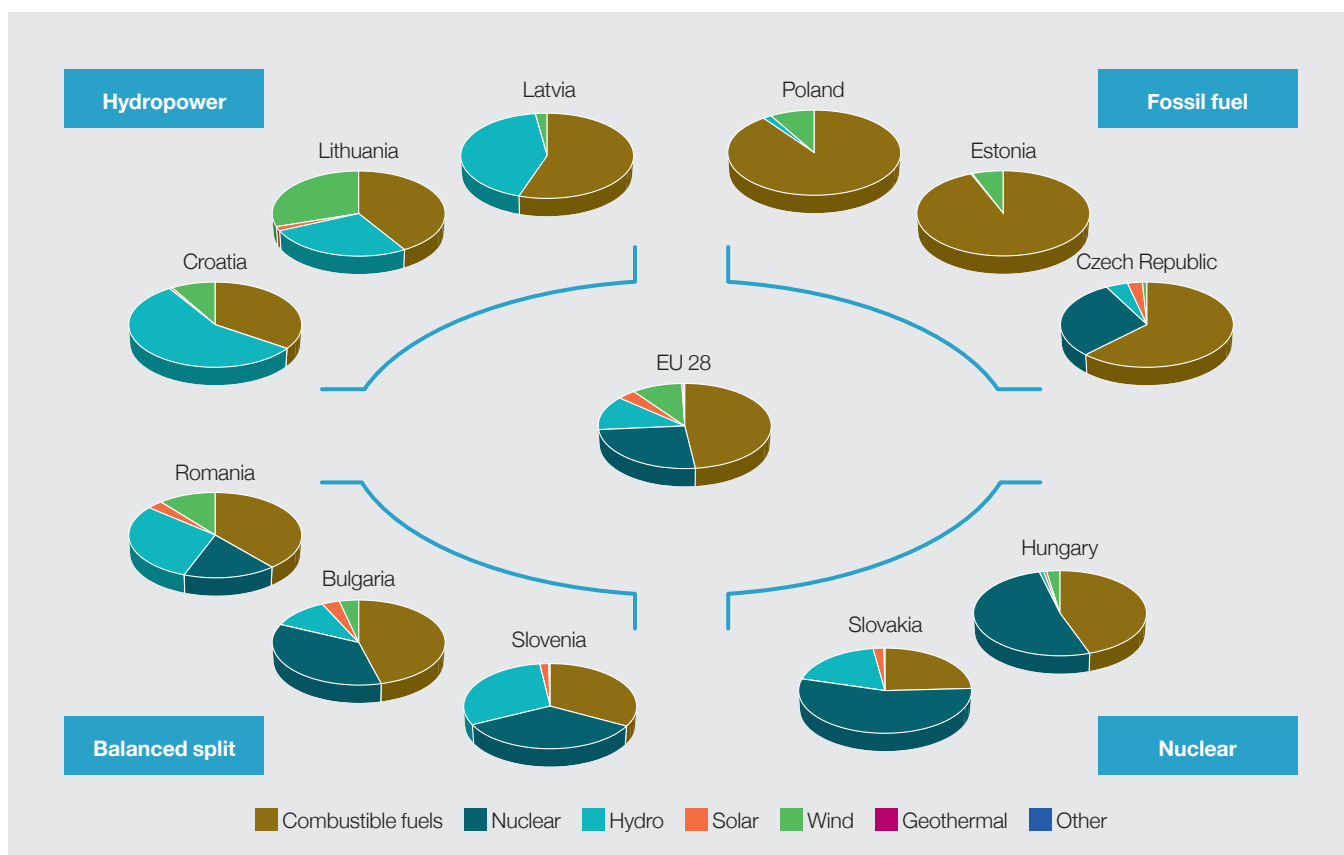
What is the overall context?

CEE countries have generally been slightly later to invest in renewable technologies compared to other EU member states, due to national energy policies, relatively low electricity prices and a lack of capital and market investors. However, in many cases, this delayed uptake has proven to be a late mover advantage, as it has resulted in more efficient, lower cost, new generation technologies becoming available.

Although the carbon emission intensity of electricity generation is lower in the CEE region than the EU average, in a few countries (such as Poland and Estonia), it is three times higher.⁴⁹ This provides a significant challenge to climate targets.

The CEE region continues to rely heavily on fossil fuels in electricity generation. There is a high proportion of nuclear energy in half of CEE countries, while the most significant renewable resource is hydropower. The combined share of wind and solar power exceeded 10 per cent of electricity generation resources in 2016 only in Lithuania and Romania. Figure 4 shows the energy mix for the 11 CEE countries that are members of the EU.

Figure 4. Electricity generation by source (2016)⁵⁰



Source: Eurostat, 2016.

Renewable energy targets

The proportion of fossil fuels in the energy mix needs to decline, and renewables increase, as agreed in the EU Renewable Energy Directive.⁵¹ However, nuclear power is also significant in the region and there are planned large investments in nuclear generation in the near future (such as in Slovakia, Hungary, Bulgaria and the Czech Republic). Nuclear power plants in one country can have an impact on the region's energy mix through interconnection. For example, the Belarus nuclear power plant shapes the energy mix in the Baltic countries.

CEE countries progress towards meeting EU 2020 renewable targets has been variable. Although Romania has relatively little wind and solar power generation, large hydropower capacity has enabled the country to meet its 2020 targets already. In contrast, in Poland, which has been historically dependent on cheap domestic coal for power, the deployment of renewable technologies has been slow and the country is expected to struggle to reach its 2020 renewable targets.⁵²

Significant new renewable capacity will need to be installed in all CEE countries in order to meet the binding target of at least 32 per cent of renewable energy by 2030 (subject to a potential increase in 2023).⁵³ In order to meet the new targets, all EU member states are required to establish integrated National Energy and Climate Plans (NECPs)⁵⁴ covering the ten-year period starting from 2021 to 2030. Using a common template, these plans will detail how each country seeks to address the five dimensions of the energy union (including energy efficiency and decarbonisation of their economy). Each member state will also need to develop a national long-term strategy that is consistent with the NECPs.⁵⁵ The key questions are how ambitious will NECPs be and how effectively will national policies on renewable energy work to deliver on them?

One other key factor is the shift in EU policy away from recognising biomass, largely in the form of firewood, as a renewable resource. Under the new Renewable Energy Directive, after 2020, these resources will no longer be fully classified as renewables. CEE countries that have a high proportion of solid biomass in their energy generation mix will need to increase support to other renewable sources (such as solar, wind, geothermal, or, in certain cases, biogas to biomethane).

The underutilised potential for renewable energy generation is likely to help CEE countries to achieve the more stringent 2030 target.

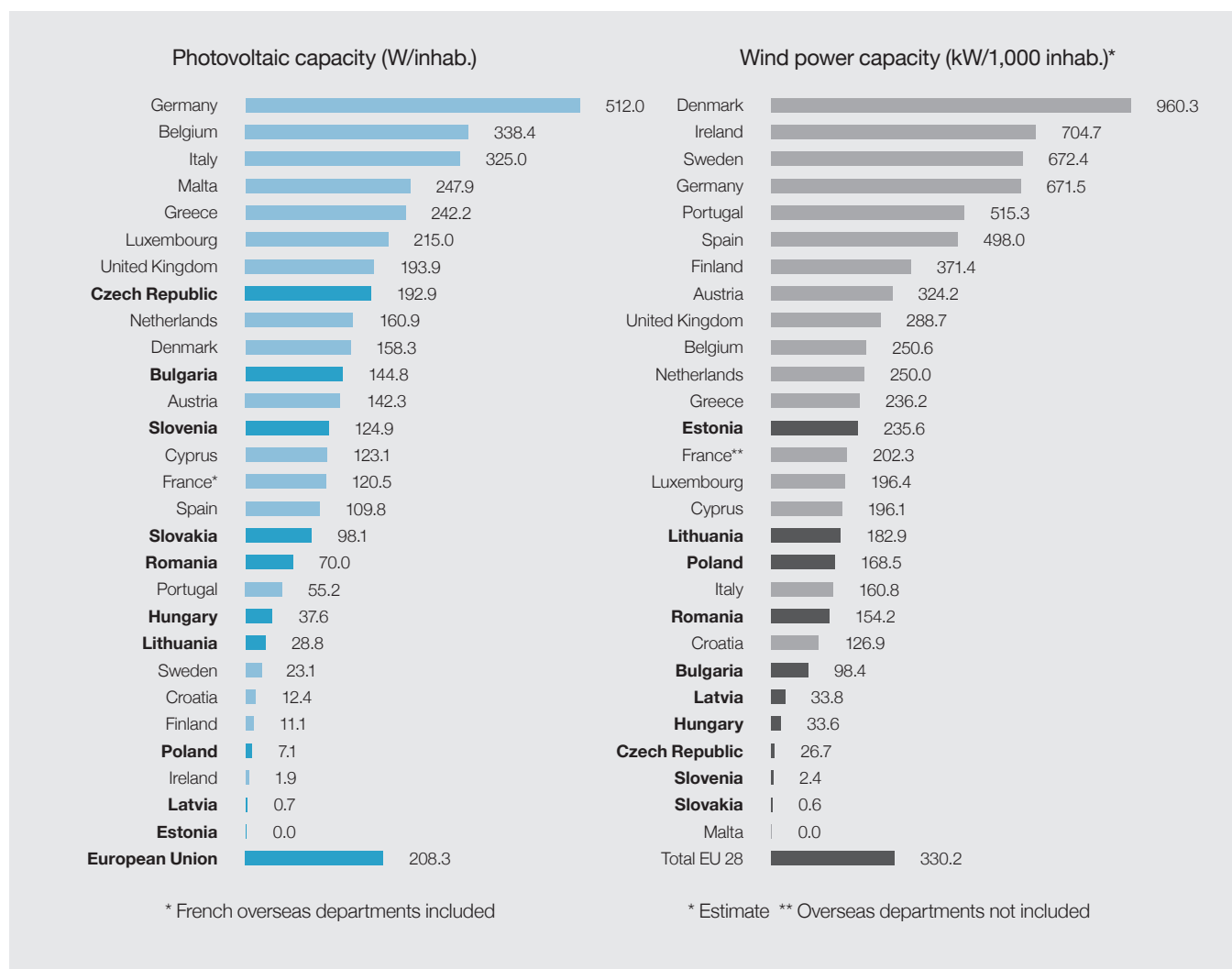
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Romania has a huge potential, and in one moment or another, this will be exploited. For 2030 the country for sure is able to reach the new target.⁵⁶

*Mihai Opreș , President,
Romanian Renewable Energy Association*

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Changes to the EU Renewables Directive post 2020 will create **new business opportunities** for companies in the renewable **energy generation sector**.

Figure 5. Solar photovoltaic and wind power capacity in the EU in 2017 ⁵⁹

What is the potential for wind and solar in the region?

The potential for renewable energy technologies differs in each CEE country, particularly in regard to climatic and natural conditions.

Geographic and climate conditions in Bulgaria, Romania and Hungary offer a great opportunity for solar investments. In these countries, solar irradiation and



In **Bulgaria, Romania and Hungary**, the solar irradiation and therefore the yearly potential sum of electricity generation from a **1 kW photovoltaic solar configuration** is approximately

1.5 times greater
than that of Germany or the UK

therefore the yearly potential sum of electricity generation from a 1 kW photovoltaic (PV) solar configuration is approximately 1.5 times greater than that of Germany or the UK. Nonetheless, the utilisation of solar energy is low or moderate compared to its huge potential. Solar PV capacity per inhabitant in the CEE region falls well below the Western European average. This unexploited potential offers an excellent opportunity for solar investments, especially in the southern part of CEE.⁵⁷

In the Baltic countries, Poland and the Czech Republic, the wind power potential is significant and provides great investment opportunities. The most suited areas are Northern Poland and Lithuania for both on-shore and off-shore wind farms. Mountainous areas in Romania and Bulgaria also have significant wind power potential which is far from being fully exploited. However, in some regions, nature conservation regulations would restrict development. Despite the very suitable conditions, the

majority of CEE countries lag behind Western Europe in wind power capacity per capita, and catching up offers significant opportunities for investment.⁵⁸

The costs of solar and wind power have decreased at a fast pace in the last couple of years, often reaching the cost level of conventional power plants in the CEE region.⁶⁰ At the same time, the cost of power generated by conventional energy sources (coal, nuclear and gas) is likely to increase because of rising CO₂ prices and the high investment and decommissioning costs of nuclear power plants (as well as the associated environmental and safety concerns). Meanwhile, the costs of solar and wind power are expected to decrease further in the future due to market expansion and technological development. As a result, renewables are increasingly expected to offer a more cost-effective alternative to both fossil fuel and nuclear energy sources.

What is the potential for other renewable energy sources?

Wave and tidal energy represent significant potential for power generation, particularly in Poland and the Baltic states. The amount of energy that can be extracted from these sources is much lower compared to other renewables, but their utilisation can be more precisely planned through highly accurate simulation models to estimate when and how much energy will be generated, as they are not subject to weather conditions.

There are excellent conditions for geothermal energy production in several CEE countries, such as Hungary. The Hungarian government intends to stimulate investment in this sector as part of its energy policy. The first geothermal heat and power plant in Hungary was connected to the grid in late 2017 and plans for further geothermal power and heating development in Hungary were announced in 2018.⁶¹ There are also good examples of using solar energy in heating and cooling systems in the southern part of the CEE region.

The development of micro-grids, smart systems and energy storage

Electricity grid operators are increasingly turning towards more flexible resources and low-cost renewable energy options like wind and solar. Depending on the grid and market structure this can mean conventional power plants like coal and nuclear earn less market revenue.⁶² The transformation of energy generation systems requires changes to the structure and operation of electricity transmission and distribution networks. These processes trigger decentralisation in the electricity grid and spur the development of micro-grids and energy storage. The spread of digitisation and smart systems can also lead to substantial changes.

Significantly improving energy storage is an urgent challenge to facilitate new, more decentralised and smarter grids. As such, it is also one of the most dynamically developing technological sectors. **CEE countries are actively pursuing technological advancement in battery storage.** The first grid-scale energy storage project in Poland (by BYD) and in Romania (by EDP Renewables) were put into operation in 2018.

The **first geothermal heat and power plant in Hungary** was connected to the grid in **late 2017** and plans for **further geothermal power and heating development** were announced in **2018**.⁶¹

The **first grid-scale energy storage project in Poland** and in **Romania** were put into operation in **2018**.

Electric cars can also have an important storage and balancing role in smart electricity systems, and **the deployment of electric cars is encouraged by subsidies in several CEE countries** (such as Hungary, Poland and Estonia). For more information, see the next section.

What challenges slow this transition?

Specific economic and political structures in many CEE countries are providing constraints on investments. Some of the most significant challenges for CEE countries highlighted through our business conversations are as follows:

1. An ageing infrastructure of electricity networks that is likely to struggle to adapt to intermittent power plants. This older infrastructure presents difficulties in power transmission, including energy losses, higher costs, limited inter-connectivity with other grids and limited power storage capacity. Major network infrastructure investment will be required in the upcoming years to eliminate the bottlenecks from integrating new power plants, particularly ones that generate energy from renewable energy sources, and to integrate new approaches such as smart or micro-grids. However, there are multiple reasons for upgrading infrastructure including reliability and, in the Baltic countries, security.

2. A significant proportion of the population is employed by the coal industry in some CEE countries, such as in Poland, Czech Republic, Romania and Bulgaria. This presents a real challenge as a large proportion of coal power plants in the EU will be permanently shut over the next five to ten years, many of them in CEE countries. Retraining and support will be required to ensure new economic opportunities for the workers who will lose their jobs. For instance, the Oltenia region in Romania is likely to lose over 10,000 coal jobs in the near future (yet there is also an opportunity as the region has some of the highest solar and wind energy potential among European coal regions). In the Silesia (Śląskie) region in Poland, there are approximately 80,000 people directly employed in coal mining. If all jobs at risk are lost (41,000), this could result in an increase in the unemployment rate

An integrated e-solution for data management in Estonia

Estonia is the most innovative country of the region in the field of smart grid development. E-solutions have led to Estonia becoming one of the world's most developed digital societies. Their technical basis for the smart grid platform is the Estfeed data exchange layer⁶³, which connects data sources, applications and market participants, and provides secure access and management of consumption data.

from 5.4 per cent to 7.5 per cent.⁶⁵ In many cases, renewable energy sources already offer possibilities for cheaper, cleaner energy generation than coal power plants, but a large part of the population still works in the coal industry, meaning that it can only be phased out step by step.

3. The policy frameworks for renewable energy support schemes are often unstable and unpredictable. In Bulgaria and Romania, comprehensive renewable support schemes stopped in 2017.⁶⁶ In Poland, the government is very cautious about supporting renewables, due to concerns that increased renewable capacity would endanger the domestic coal industry, which is regarded as culturally and economically important to the country. In certain cases, such as solar PV investments in the Czech Republic, high tariffs have led to explosive growth. This can have adverse effects, such as network problems and the unsustainability of the financing system.

4. Prohibitive regulations can restrict new renewable capacity. Since June 2017, a Government Decree in Hungary prohibited the construction of wind turbines within a 12 km radius of residential areas, effectively banning their construction across the whole country.⁶⁷



Drilling on a geothermal well platform, Hungary
(credit: HappyManPhotography)

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The Baltic states plan to de-synchronise their energy system from the Russian grid by 2025, and synchronise it with the grid of continental Europe.⁶⁴

*Mihkel Annus, Chairman,
Estonian Renewable Energy Association*

In general the support for renewable energy sources has been decreased throughout the years, while for example the support for electricity from CHP stays unreasonably high even in violation of the rules for state aid.⁶⁸

*Petko Kovachev, Executive Director,
Green Policy Institute Bulgaria*

Rising electricity prices and CO₂ quota prices will clearly turn companies and governments to renewables in the future.⁶⁹

*Balázs Felsmann,
Regional Centre for Energy
Policy Research, Hungary*

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How are business consumers responding?

Self-sufficiency is becoming an increasingly appealing option for business customers who are exposed to relatively higher energy prices. The most effective way to avoid the negative impacts from price increases is often for companies to engage in small-scale on-site renewable generation.⁷¹

Companies commit to 100 per cent renewable energy targets

Several large international companies in the CEE region have joined the **RE100 initiative**⁷⁰ led by The Climate Group in partnership with CDP. These companies have set a 100 per cent renewable target for their electricity consumption (such as IKEA, Tesco, Decathlon, H&M, Signify and Lego). The region's favourable and largely underexploited conditions for renewable energy generation can help achieve these goals. However, perhaps as a result of unfavourable policy frameworks and a lack of regulatory stability, companies prefer to buy electricity from on-site renewable power plants using Power Purchase Agreement (PPA) or Energy Service Company (ESCO) financing. Subsequently, many companies are looking for local green electricity producers. This business opportunity is currently being exploited by some innovative local companies in the region, such as Alteo (Hungary) and Polenergia (Poland). They provide energy services and energy trading, operating their own power plants with a high percentage of renewable energy.

RE 100

THE CLIMATE GROUP



Solar panels on rooftop, Estonia (credit: Dmitri Smoljannikov)

Section 4

Mobility

In any economy, transport is a major component of energy demand and is currently a major contributor to greenhouse gas emissions.

Transport currently accounts for approximately a third of primary energy consumption in the EU. Its share has been growing steadily during the last three decades and has grown nearly four times as much in CEE countries compared to the original EU-15.⁷² On the European level, demand for both passenger and freight transport increased steadily between the 1990s and 2007. This has been in

parallel with the economic growth in this period. The economic recession and a period of high oil prices caused a decline in mobility demand between 2008 and 2013, especially in freight transport (passenger transport demand has been more stable). However, this proved to be temporary, and demand for passenger transport began to increase again after 2014.⁷³

What is the demand for mobility in CEE countries?

During the past three decades, several factors have led to an increased demand for mobility in CEE countries. Changing spatial patterns, such as urban sprawl (which has increased with the weakening of centralised planning control), have led to increased travel distances. Furthermore, improved transport connections, especially new motorways in urban areas, have enabled more people to commute over longer distances.^{74, 75} For example, the number of daily commuters to Tallinn, Estonia, tripled between 1982 and 2000.⁷⁶ Increasing purchasing power and changing lifestyles have also led to an increase in holiday trips to more distant destinations, including the expansion of international travel, which previously was very restricted. Freight volumes are growing, with higher levels of trade both within and outside the EU.⁷³

Historically, CEE countries demonstrated an extremely high share of public transport within all trips due to the centralised and collective nature of the socialist economy, a high volume of public transport supply and very limited access to

private cars. After the economic and industrial transition period of the early 1990s, these factors weakened or ceased to exist, while private car ownership and use became a status symbol.⁷⁷ At the same time, growing purchasing power led to an increase in car ownership and use, although exact patterns varied in different countries. Private car use as a method of transport in the CEE countries still lags behind the EU-15 figure of around 82 per cent of all land transport, but this gap is narrowing.⁷³ In terms of passenger car ownership, Poland, Estonia and Slovenia have already surpassed the EU average and are still growing. The Czech Republic is close to the EU average, while other CEE countries have the lowest rates within the EU.⁷⁸

Despite improvements to the road networks in CEE countries, the rapid growth in the use of private cars has put pressure on infrastructure. As a result, **the growing pressure on the limited infrastructure creates the need for developments in Intelligent Transportation Systems (ITS).**⁷⁹

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The approach to the private car has been different in CEE. As access was very limited before, it turned into a status symbol in the 1990s as people could finally afford it. In order to encourage car owners to share their free seats, we have to dismantle this ‘my house my castle’ approach, and degrade the car to a tool for taking you from A to B.⁸⁰

Attila Prácser, Managing Director, **Oszkar.com**

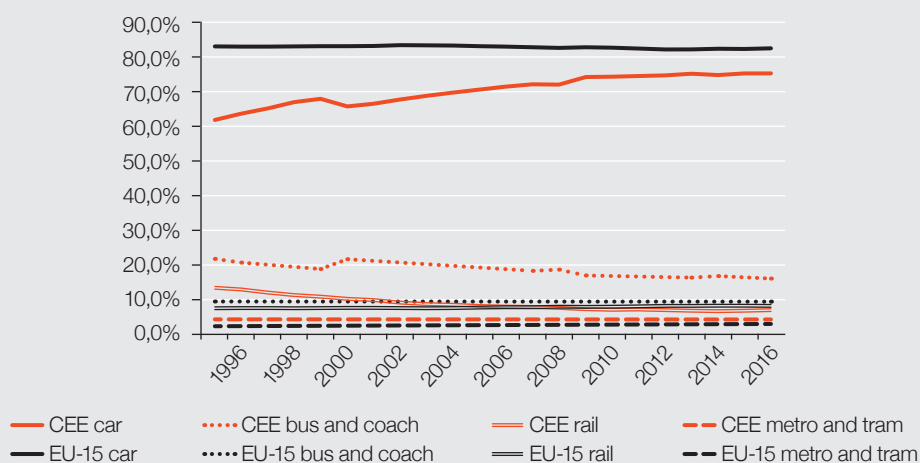
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In the West, they lost public transport passengers to cars and now try to get them back; in CEE we have the chance to stop the decrease earlier. Fortunately, we could not afford large road infrastructure projects like major cities in Western Europe, which sets a natural limit to car traffic.⁸¹

Łukasz Franek, Deputy Director,
Krakow Road and Transport Authority, Poland

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Figure 6. Modal split of passenger transport on land (EU-15 and CEE)

Source: Calculation (taking into account passenger cars, buses and coaches, tram and metro, and railways) based on Statistical pocketbook 2018.⁸²

Freight has a similar story to tell - the restructuring of the economy led to a significant market loss from the railways to road transport. This was due to the collapse of socialist heavy industry, the appearance of more diverse consumer products, the growing importance of services and the introduction of new logistics concepts. However, railways still have a relatively strong position in the CEE region (31 per cent as compared to 15.3 per cent in the EU-15),⁸³ especially in the Baltic countries due to the transport of Russian energy products to Baltic ports.⁸⁴

CEE countries generally inherited neglected infrastructure for railway and public transport systems from the socialist period, and both their development and operation were underfinanced following the transition period during the early 1990s. However where regional public transport has been completely liberalised (such as the regional bus service in Poland or Romania) it has usually resulted in very limited and low-quality service, and the further loss of public transport market share to private cars.

The ongoing modernisation of public transport systems (infrastructure, vehicles, fleet management, passenger information, ticketing etc) offers business opportunities for specialised companies. However, there are large differences in technology-



readiness. For instance, while the city of Tallinn in Estonia already operated electronic ticketing in 2004, in Hungary the first e-ticketing systems are still in pilot phase.

The growth of Solaris Bus & Coach in Poland

Solaris Bus & Coach is one of the leading European manufacturers of public transport vehicles, including buses, trolleybuses, trams and e-buses. Founded in 1994 as Neoplan Polska (a branch office of German company Neoplan), it produced the first low-floor bus in 1996. The company soon turned towards developing its own models and presented the first urban bus of the Solaris brand in 1999. In 2001, it was renamed Solaris Bus & Coach and became a joint-stock company.

While the first generation of the Urbino buses were produced primarily for the domestic market, foreign orders already exceeded those from Poland for the second generation (introduced in 2002). As the first European manufacturer, Solaris started the serial production of a hybrid bus in 2006. Currently, they also sell compressed natural gas (CNG), electric and trolleybuses all over Europe. 'Solaris Urbino 12 electric' was named "Bus of the Year 2017" by a jury of editors from 20 countries in a global competition.⁸⁵ Trams are also produced by its subsidiary Solaris Tram. In 2018, Solaris Bus & Coach was acquired by rolling stock manufacturer CAF (Spain).



Private railway operators offering customer friendly services like internet ticketing, Wi-Fi or easy refund, served as inspiration for their competitors, but also for regional transport authorities in meeting the rising expectations of passengers.⁹⁰

*Lukáš Hrmel, KODIS, Specialist,
Department for Transport, Czech Republic*



E-mobility is making a breakthrough

Despite significant increases in sales, battery electric vehicles (BEV) and plug-in hybrid electric vehicles (PHEV) still only account for 0.6 per cent and 0.8 per cent respectively of new passenger car registrations in the EU.⁹¹ Within the total passenger car fleet, the share of plug-in electric vehicles (PEV) is around 0.31 per cent in the EU-15. The rate in the CEE region is much lower at around 0.02 per cent.⁹²

This data suggests that **the take-up of e-mobility in CEE follows Western European trends with some delay.** Most CEE countries offer a set of incentives for electric vehicles such as registration and ownership tax benefits, purchase grants and/or local incentives like parking fee reductions.⁹³ Governments have also invested in developing charging networks (with several hundred charging points in most countries by the end of 2018), often under specific public sector programmes with ambitious targets. Supporting e-mobility is a topic with no major opposition and can be coupled with other policies, such as further foreign investments in the already strong vehicle manufacturing industry of the region.



Electronic ticketing in Tallinn

The Estonian capital Tallinn introduced electronic ticketing in 2004. The first system was based on the Estonian electronic identity card,⁸⁶ which is a highly developed national ID card system offering services such as digital signatures and electronic voting. The ID card is also used to promote the Estonian IT sector.⁸⁷ In 2012, a new system was introduced, based on contactless cards, covering both Tallinn and the surrounding Harju county. It was developed by Estonian technology company Ridango,⁸⁸ and later extended to Park&Ride and some other municipal services beyond mobility. Contactless bank card payment was also introduced in 2018.⁸⁹ A specific innovative concept is free public transport introduced in Tallinn. The core objective for this was to register citizens in order to increase the local tax base rather than to meet transportation needs.

National e-mobility programmes of Poland and Hungary

The Polish national e-mobility strategy is supported by government funding of EUR 2.8 billion until 2028, mainly via a Low-Emission Transport Fund set up in 2017. It supports the purchase of public and private electric vehicles, including a large number of electric buses. New legislation allows cities to introduce new, flexible tools supporting sustainable mobility, including environmental zones and parking regulations favouring electric vehicles. The January 2018 Act on Electromobility and Alternative Fuels also sets gradually increasing minimum shares of zero-emission buses in the fleets of cities with over 50,000 inhabitants.⁹⁴

In Hungary, the Jedlik Ányos Plan⁹⁵ serves as an umbrella of measures promoting e-mobility. These include the development of the legislative framework, grants for charger deployment (for municipalities) and for e-vehicle purchase, as well as direct and indirect tax incentives.⁹⁶ Consequently, there are business opportunities both in terms of charging infrastructure (such as in cities, on highways or at residential, commercial units or workplaces) and vehicles (public and private electric vehicle fleets). However, the deployment of charges is often delayed for bureaucratic reasons.



Leo Express train at Prague main station, Czech Republic (credit: András Ekés, Mobilissimus)

However, **lower purchasing power and a lower share of second cars in households is a barrier to the growth of the market.** Furthermore, many CEE countries (especially Slovakia and Hungary) are dependent on conventional car manufacturing,⁹⁷ which limits the political willingness to adopt strict regulation on the use of internal combustion engine vehicle (ICEVs). The average age of a vehicle fleet is also high in the CEE region.⁹⁸ This, together with the ever stricter emission regulations in Western European

countries and cities, leads to the risk of a continued influx of polluting (mostly diesel) used vehicles to the CEE region.⁹⁹

In the medium and long term, the tightening of EU regulations (such as the post-2020 CO₂ targets for cars and vans agreed in December 2018^{100, 101}) should have a positive impact on the growth of electric and other alternative vehicles.

What are the future trends?

In addition to e-mobility, there are further trends which are expected to have a structural impact on mobility. Although some of these have been operating for years, they are now in the phase of becoming visible on a larger scale, and their combined impact is expected to fundamentally change the transport system. New solutions and business models tend to become viable first in dense urban areas with high traffic pressure and then gradually expand to other areas.

1. Shared mobility. This started with bike-sharing systems in the region,¹⁰² especially in the Visegrád countries and Croatia (including MOL Bubi in Budapest and Wavelo in Krakow). Bike-sharing was followed by free-floating services of bicycles and other small electric vehicles in some major cities. Car-pooling or ride-sharing became dominated by the company BlaBlaCar, except for in Hungary where local start-up company Oszkar.com has a strong market position. GreenGo opened the car-sharing market in Budapest with a fully electric fleet,¹⁰³ followed by MOL Limo.

While in some countries (such as Croatia or the Czech Republic) the regulatory framework is clear, in other cases it is either completely missing (Hungary) or has specific challenges that limit opportunities (such as restrictive parking regulations in Romania). Limited market size can also be a barrier as these solutions are most viable in major cities.

Regional oil company MOL turning towards mobility services

MOL Limo is a Hungarian car-sharing service owned by regional oil and gas company MOL Group, with members MOL (Hungary), Slovnaft (Slovakia) and INA (Croatia). The group foresees a shift towards offering a wider range of services for people on the move in its Strategy 2030. The ambition to “take part in the reinvention of transportation in CEE” includes the aim to become a regional leader in offering alternative fuels, as well as becoming a service provider for car-sharing, electric mobility, the operation of vehicle fleets and solutions for public transportation in cities.¹⁰⁵ In addition to sponsoring bike-sharing systems MOL Bubi (Budapest)¹⁰⁶ and Slovnaft BAjk (Bratislava)¹⁰⁷ and starting MOL Limo (running 450 shared cars in early 2019),¹⁰⁸ MOL also acquired a majority share in ITK Holding, a bus operator currently active in Budapest and Debrecen.¹⁰⁹

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Like information technology, the future of mobility relies on three pillars: hardware (fleet), software (shared mobility) and infrastructure (e-mobility).¹⁰⁴

Richárd Sáreczky, Managing Director, MOL Limitless Mobility, Hungary

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2. Autonomous and connected vehicles. There has been early development of this market in the region, such as an autonomous minibus shuttle service in Estonia that was put in place under the EU presidency. Countries dependent on the conventional car industry are seeking to shift towards more future-proof segments of the industry, including electric vehicles and batteries or autonomous and connected vehicles.



Bicycle counter in Gdynia, Poland (Antal Gertheis, Mobilissimus)

3. Mobility as a Service (MaaS). With the shift from ownership of vehicles towards using services, the concept of MaaS is expected to integrate the offer of different service providers into personalised mobility options and pricing packages via the user's smartphone. While CEE cities have fewer resources to build heavy infrastructure, IT companies can help develop smart and cost-efficient solutions. The ability to develop opportunities in the future will be influenced by the different levels of technology readiness and public policy across CEE countries.

The car industry is investing in autonomous vehicles

The Hungarian government is developing ZalaZone in Zalaegerszeg, where automotive companies can test their products, including electric and autonomous vehicles and their main system components. In addition to traditional test track features, the complex is aiming to become "a full-range validation facility for the vehicles and communication technologies". It has the aim to shift from conceptual tests to the real public road environment in the city of Zalaegerszeg and selected roads in the cross-border region with Slovenia and Austria.¹¹⁰

Budapest-based Almotive is working to become a global provider of vision-first self-driving technology.¹¹¹ With a licence to test on the roads of California, as well as raising USD 38 million venture capital and receiving a EUR 20 million loan from the European Investment Bank in 2018, the 200-strong company is looking to scale up its operations in this rapidly evolving segment.¹¹² Another start-up company, Commsignia, is developing Cooperative Intelligent Transportation Systems (C-ITS), such as Vehicle-To-Vehicle (V2V) and Vehicle-To-Infrastructure (V2I) communication technologies. They are partnering with automotive companies and are involved in several smart city projects globally.¹¹³

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If we talk about software and smart solutions, they should be done by the private sector. If we talk about the creation of the transport system, it should be the public authorities.⁸¹

*Łukasz Franek , Deputy Director,
Krakow Road and Transport Authority,
Poland*

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E-mobility, MaaS and, in the medium term, autonomous vehicles will change the mobility market and our lives fundamentally. Owning a private car will be something special, like owning a horse.¹¹⁴

*Bálint Michaletzky , Managing Director,
GreenGo Car Europe, Hungary*

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Conclusions and recommendations

Relative lack of purchasing power, unclear and unstable policy frameworks, lack of industry capacity and ageing infrastructure all combine to mean that the CEE region risks lagging behind other European companies in adoption modern standards of the built environment, power generation and mobility. However, strong economic trends, ongoing European regulation and increasing environmental pressure will increasingly incentivise the market

towards more energy efficient building solutions, low carbon power generation and innovative transport options. Progress in this direction has the potential to deliver more comfortable homes, cheaper power, cleaner air and more flexible transport. For these opportunities to be fully realised, this business conversation paper has identified the following recommendations.

Recommendations for businesses

Businesses in the CEE region have the opportunity to benefit from becoming part of the new, zero-carbon economy through developing new products and services, as well as, leading by example, by:

- **Offering new financial products and services** tailored to specific groups of consumers that enable these consumers to choose more energy efficient options, for example, when undertaking building renovations, by reducing the cost barrier.
- **Bringing to market new products and technological solutions** designed to meet the consumers' needs, taking into account specific market challenges.
- **Decarbonising their operations in the region.** Potential options include investment in renewable sources, reducing the energy use of production and logistics, shifting to rail transport, using electric vehicles and cargo bikes for deliveries (especially in urban environments) and incentivising sustainable commuting habits of their employees.

General policy recommendations for decision makers

Governments in the CEE region have the opportunity to consider how to enable better business involvement in their transition to a low carbon economy, as follows:

- Along with other EU member states, countries in the CEE region will need to submit final National Energy and Climate Plans (NECPs) by the end of 2019, setting out their vision and strategy for achieving agreed EU goals for 2030. As they finalise their NECPs, **we recommend governments in the region:**
 - **examine the significant economic opportunities for their country** in energy efficient buildings, renewable technologies and mobility services.
 - **consult with businesses** that have a clear and positive message to share about the benefits of deploying new, more sustainable modes of operation.
 - **support training and retraining initiatives** that enable the development of new skills that contribute towards the development of more energy efficient services.
 - through systems, for example, urban planning, take a **holistic approach** to these issues and see how policies in different areas can reinforce each other.
- Create a **stable and reliable regulatory and subsidy environment.** Providing market stability is essential to attracting long-term commitment from investors in the low carbon energy transition.
- **Ensure more effective public investments by examining the market for private sector solutions and the industries of the future.** Public investments will need to be made in infrastructure to which businesses and end-users can connect, for example, improving the ability of the grid in terms of integrating renewable electricity, facilitating the deployment of standardised electricity chargers for PEV, and supporting education to improve workforce capacity.
- **Plan an inclusive and just transition.** As the regions' economies grow and innovate, some communities risk being left behind, such as energy-poor households, those without access to affordable transport and those whose jobs may be lost. Governments can consider how they may address this directly through policy and indirectly through working in collaboration with business leaders to support the transition.

The EU as a whole should provide funding to support the transition in member states by investing in bottlenecks such as ageing infrastructure, lack of skills capacity and policy support, or to de-risk major new technological investments, whilst ensuring such money is transparently accounted for so EU citizens are able to see that such funds are used effectively.

Next steps

The CLG will continue to increase its engagement with businesses and policy makers in the CEE region in line with these aims. To find out more about this work, please contact us at clg@cisl.cam.ac.uk.

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