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An evaluation framework for energy justice

An assessment of two case studies in Austria and the Netherlands on the best governance practices in achieving energy justice

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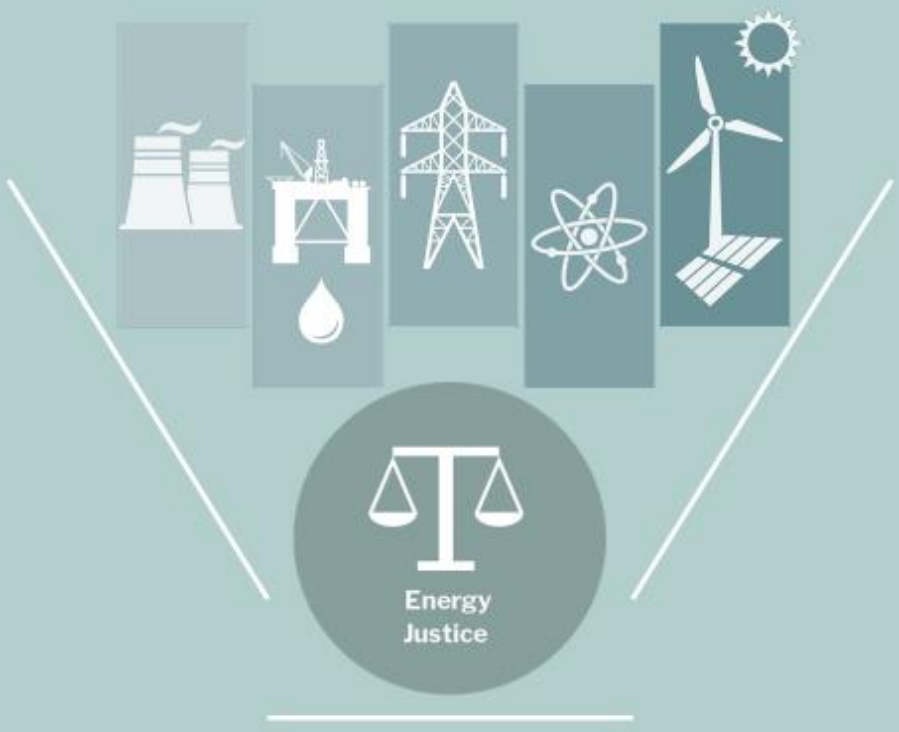

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Summary

The transition towards a clean energy system is not solely a technical and economic challenge, but also a major social challenge. The transition transcends question of who gets what, when and how, as the costs and benefits of the transition are not equally distributed between and within countries, regions and households. An 'unjust' transition affects political support which is essential for a successful transition.

To better understand the justice implications of the energy transition and the best policy practices to address them, the concept of energy justice has emerged on the social science research agenda. Energy justice seeks to apply principles of justice to energy policies. However, the literature on energy is relatively young and there are limited insights on how energy justice can be operationalised and put into practice in order to promote just energy transitions. Therefore, this study aims to develop and test a framework to assess energy justice.

To do so, first an evaluation framework was developed based on literature of energy justice and energy transitions. The framework consists of the three dimensions of energy justice: (1) *distributive justice* (the allocation of costs and benefits among stakeholders), (2) *recognition-based justice* (the recognition of the misrecognised in society and the respectful treatment of opposed voices) and (3) *procedural justice* (e.g. inclusiveness and transparency of procedures). This framework was empirically tested on two case studies:

- Burgenland, Austria, illustrates a successful regional example of the roll-out of renewable energy generation;
- Engie, the Netherlands, demonstrates the successful phase-out of the coal fired plant, Centrale Gelderland 13.

The assessment was based on document study, 18 semi-structured interviews and statistical data. The evaluation framework includes a scoring system and scores both cases high on the three dimensions of energy justice. The Burgenland case shows best practice among others in using the energy transition as a tool to boost a region economically, socially and environmentally, while relatively fairly distributing the benefits and costs. The Engie case demonstrates the best practices among others in mitigating the negative impacts that come with a phase-out e.g. employment impacts.

After the empirical confrontation, the evaluation framework was further specified and revised. Overall, this study evidenced that energy justice concerns many aspects of the energy transition, from energy availability and affordability for now and in the future, to concerns about nature and employment impacts. The study concludes that this evaluation framework for energy justice offers a way forward to govern the energy transition.

Key words: energy justice, just energy transition, energy policy, evaluation framework.

Acknowledgments

This study is the final product of my seven months long journey in discovering the justice implications of the energy transition and the concept of energy justice. I wrote in my research proposal that the energy transition is a major social challenge. However, when conducting this study, I realised the sincerity of this challenge. I hope that my study can contribute to the scientific literature of energy justice metrics, but even more, I hope that my study can contribute in bridging the gap between economic and political considerations versus the more social and environmental consideration in energy policy making.

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Contents

Abbreviation list

BEA	Burgenland Energy Agency
CG13	Centrale Gelderland 13
EC	European Commission
EU	European Union
GHG	Greenhouse gases
MS	Member States
NMBY	Not-in-my-backyard
NREAPs	National Renewable Action Plans
OECD	Organisation for Economic Co-operation and Development
PV	Solar Photovoltaic
R&D	Research and Development
RED	Renewable Energy Directive
RES	Renewable Energy Sources
TOB	Technology Offensive Burgenland

1. Introduction

1.1 Societal background

Climate change is one of the most pressing and wicked problems facing society in the Anthropocene, with planetary boundaries being pushed and, indeed, transcended in some instances (Steffen et al., 2018). To stay within the planetary boundaries, it is essential that temperature rises do not exceed the 2°C above pre-industrial level (Steffen et al., 2015). To achieve this, the reduction of energy-related emissions is pivotal as it is responsible for 65% of the global GHG emission in 2016 (IEA, 2019) and 75% of the EU's GHG emissions (EC, 2018). Consequently, the transition from non-renewable energy sources to renewable energy sources (RES) is an urgent task for the world, now and in the future.

Several initiatives and policies at international, supranational and national levels have been established to facilitate the transition towards a low-carbon energy society. At the European level, targets have been set to phase out fossil-based fuels and to promote renewable energy sources. For 2030, the Member States (MS) are required to meet the targets of 32% renewable energy and 32.5% energy efficiency[1] (EC, 2019a).

Achieving this aim presents a considerable challenge to many countries. Phasing out non-renewable energy sources requires innovation in the development of suitable technologies and novel solutions.
The transition is not only a technical challenge, but also a financial challenge as the transition has high costs. It is estimated that 500 billion of investments in clean energy is needed annually to support this transition (EC, 2019b). On top of that, the transition also encompasses further economic, legal and spatial challenges (NERA, n.d.; Sovacool, 2014).

Equally important however, is the social and regional dimension of the energy transition as costs and the benefits of the energy transition are not equally distributed between and within countries, regions and households (Li et al., 2016). This mal distribution is partly due to physical characteristics with certain areas suited for wind energy and others more suited towards solar power for solar photovoltaic (PV). However, the energy transition tends to increase inequalities as it stimulates uneven development (Bouzarovski and Tirado Herrero, 2017). In the past decade, several studies have linked the energy transition with increased regional disparities, income inequality and energy poverty[2] as the energy transition is accompanied with increased energy prices or regressive energy policies (Bouzarovski and Tirado Herrero, 2017; Grösche and Schröder, 2014; Neuhoff et al., 2013; Schlesewsky and Winter, 2018).

The positive and negative impacts from the energy transition and the nature of their distribution throughout society raise issues of fairness and justice (Sovacool and Dworkin, 2015). As such, the energy transition has received public opposition, especially from communities where local projects need to be implemented (Perlaviciute et al., 2018) or from citizens who fear that they are the ones paying for the energy transition. As a result, several political parties who do not support, or even hope to delay, the energy transition have recently gained more votes in the EU (Adelphi, 2019; Fraune, and Knodt, 2018). A just transition is therefore important to obtain political support and public acceptance, which is essential

[1] These targets may be reviewed upward in 2023.
[2] *'Energy poverty can be understood as the inability of a household to secure a socially and materially necessitated level of energy services in the home' (*Bouzarovski and Tirado Herrero, 2017, p.1).

to meet the renewable energy targets by 2030 and to recognise the interest of all stakeholders (Perlaviciute et al., 2018; Zimmerman and Pye, 2018).

To do so, it is first important to understand the justice implications of the energy transition and how policies can promote justice in the energy transition. Effective energy policies could play a substantial role in the distribution of positive and negative impacts (Kirström, 2006). There are several policies at national and regional level that the promote a more just energy transition such as tax reductions to make the energy transition affordable and accessible for different income levels. Some more social policies aimed at vulnerable consumers (e.g. low-income households, the sick or elderly, the youth and ethnical minorities) policies to improve the energy efficiency for social rent housing, for instance. Furthermore, there are policies that target the education and reskilling of coal plant workers to ensure job security for those previously employed in the non-renewable sector. However, there is a need for systematic insights into the effectiveness of these policies that aim to address unjust energy transitions.

1.2 Problem statement and scientific background

In reaction to this need to better understand the justice implications of the energy transition and the best policies and practices to address them, the concept of energy justice has emerged on the social science research agenda. Energy justice seeks to apply principles of justice to energy policy, energy production and systems, energy consumption, energy activism, energy security and climate change (Jenkins et al., 2016). In addition, several scholars see energy justice as a valuable tool for decision making in the formulation of energy policy (Heffron et al., 2015).

The scientific literature on energy justice is relatively young however (Jenkins et al., 2016). For this reason, there has been little reflection of how energy justice can be applied in practice and how energy justice can be palpably achieved through (energy) policy (Heffron and McCauley, 2017). As a result, energy justice remains an abstract concept for policy makers, retarding its meaningful incorporation into policy making. At the same time, economic considerations such as efficiency and political priorities e.g. energy security have been more dominant in the formulation of energy policy (Heffron et al., 2015). It is therefore important that energy justice will be better measurable for policy makers so that countries or regions can monitor their performances on energy justice overtime. Moreover, by quantifying energy justice, countries or regions can benchmark themselves and lastly, can study synergies and trade-off within different elements of energy justice or between other policy areas (Sovacool and Mukherjee, 2011).

Despite the relative immaturity and perceived abstractness of energy justice research, there are some studies which focus on the quantification of this concept. One of the first energy justice metrics was developed by Heffron et al. (2015). In this article the metric is based on the energy trilemma concept which tries to balance three competing aims in the energy transition, namely environment, economics and politics. The metric can be calculated for energy technologies, for countries and can be incorporated in economic models that compares the prices for building different energy infrastructure. In 2019, this article was updated by Heffron et al. (2019) where they used the metric to analyse the energy justice performance of four European countries and the United States.

Even before these studies, Sovacool and Mukherjee (2011) had developed a framework for analysing national energy security policies and their performances. To do so, they operationalised five energy justice principles, namely: availability, affordability, technology development, sustainability, and regulation. Although these studies quantitfy energy justice, there is need for more insights in the operationalisation of energy justice and how it can be used in different contexts.
Furthermore, the commonly used dimensions of energy justice, namely distributional dimension (are the costs and benefits equally distributed?), recognition-based dimension (which sections of society are misrecognised or not treated with respect?) and the procedural dimension (which processes exist to reveal and reduce injustice?) (Jenkins et al., 2016) have not been operationalised and empirically tested. For this reason, there is need for empirically validated framework that operationalises the three dimension of energy justice.

1.3 Study's aim and question(s)

Based on the scientific gap identified, this study aims to contribute to the understanding of the justice implications of energy transitions and the identification of best available governance practices in promoting a just energy transition by developing and testing a metric to measure energy justice in two case studies, one in Austria and one in the Netherlands. Based on these insights, first steps towards policy recommendations are developed so that the negative impacts from the energy transition can be reduced and the positive effects are maximised.

Therefore, this study addresses the following research question: What are relevant metrics to assess energy justice and what governance practices have demonstrated a positive contribution to energy justice?

The study is guided by the following sub-questions:

1. What concepts are discussed in the literature about energy justice?
2. How can the three energy justice dimensions of distributive, recognition and procedural, based on literature, be operationalised?
3. How and to what extent have the different justice dimensions been present in the case studies?
4. How are the cases evaluated in terms of their performances in achieving energy justice?
5. What lessons for revising and specifying the evaluation framework can be drawn from its empirical confrontation?
6. What additional lessons can be drawn from this study and how does this study fit in the literature relevant for energy justice and just energy transitions?

1.4 Research framework

This study has an explorative character as it develops and tests a metric to measure energy justice. The six sub-questions are reflected in the research framework (see Figure 1-1) which presents the numerous steps necessary to execute this study.

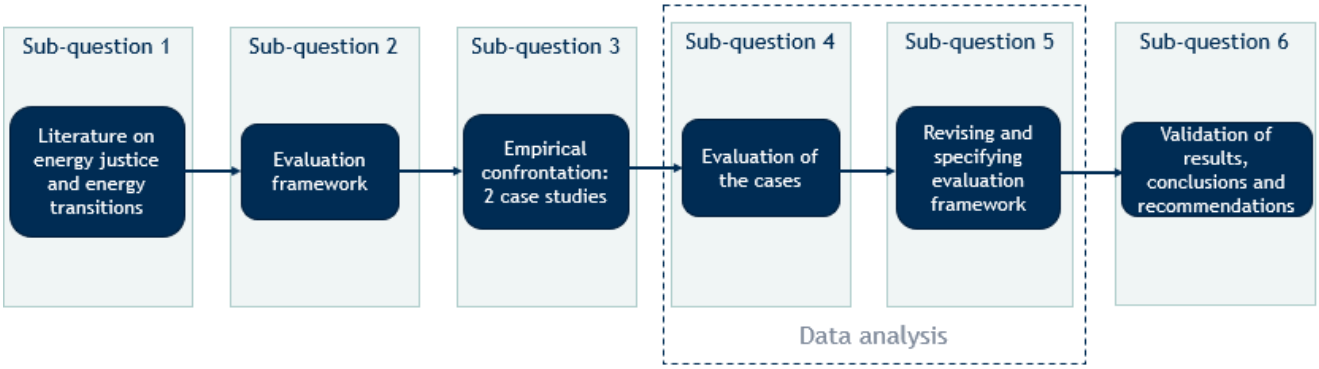

Figure 1-1. Representation of research framework

To answer the first question, literature on energy justice and energy transitions is consulted. In the literature it is first important to further define the concept of energy justice and the three dimensions (Jenkins et al. 2016). The next step is to operationalise the evaluation framework by finding suitable indicators to measure energy justice, as part of sub-question two. Sub-questions one and two lay the theoretical basis for the evaluation framework which is further added to with empirical findings derived from the two case studies.

The first case is that Burgenland in Austria, where the region achieved 100% self-sufficiency in energy consumption through the installation of wind, biomass and solar energy. The second case that of Engie, the Netherlands, where Centrale Gelderland 13 (CG13), a coal fired plant with 150 workers, was successfully closed and transformed into a clean energy hub. Significantly, in both cases, policies have been successful in maximising positive effects (e.g. higher educational levels and lower income inequality) and reducing negative effects (e.g. increased unemployment or reduced income (Del Río and Burguillo, 2008). By assessing the two cases, sub-question three is addressed.

In sub-question four, the cases are evaluated on their performances on energy justice by the use of scoring system. In doing so, the best governance practices are identified in achieving energy justice. Furthermore, after the empirical confrontation, the evaluation framework is revised and specified, as part of sub-question five.

For sub-question six, the results are validated and contextualised in the broader perspective by discussing their contribution to the existing literature. Lastly, based on the insights obtained, conclusions are drawn, and policy recommendations are formulated.

1.5 Scientific and societal relevance

This research has both scientific and societal relevance as it contributes to a broader understanding of the justice implications of the energy transition and identifies the best governance practices to realise energy justice. The study contributes to the literature on energy justice as there are not many quantified and empirically evidenced energy justice frameworks developed yet (Heffron et al, 2015; Heffron et al., 2019; Sovacool and Mukherjee, 2010). Moreover, the framework will be built on a

different approach to energy justice (the three dimensions) as other metrics and its scope will include local and regional levels whereas other frameworks solely include the national level.

Furthermore, the evaluation framework will help policy makers to include energy justice in their policy design and monitor their performance overtime. As a result, energy justice will be less abstract for policy makers as it is broken down in quantifiable indicators. Consequently, the evaluation framework can be used as a tool to make the energy transition more just which will increase the public support for the energy transition which is needed to achieve the renewable energy target within the available time (Delina and Sovacool, 2018). Additionally, this study contributes by providing examples of effective policy designs that illustrate the best practices in energy justice. The policy recommendations can support policy makers in their policy design. Thus, this study has both scientific and societal relevance as it connects theory with practice and contributes to the challenges of the energy transition.

2. Conceptual framework

To answer sub-questions one and two, scientific literature is consulted to further define energy justice and to develop the evaluation framework for energy justice. In this study, energy justice is split into three dimensions, namely distributive, recognition and procedural justice (Jenkins et al., 2016). Subsequently, each dimension is discussed in more detail and operationalised so that it can be applied to both the opening and closing of energy systems.

2.1 Defining energy justice

There is a rich body of literature about justice, fairness and equity in climate change politics (Ikeme, 2003; McDermott, et al., 2013). Justice, fairness and equity all imply "*fair treatment or due reward*" (Schroeder and Pisupati, 2010, p.13). While related, each of the three concepts is nuanced however e.g. equity focusses more on evaluating change in the relative situation of particular groups in society. Justice, on the other hand, is a more overarching term as it includes treating people with equal respect and equal rights (Walker and Day, 2012). As such, the concept of justice is more suited for the aim of this study as enables a broad analysis encompassing the different aspects of the energy transition.

In the last decades, justice has been incorporated in climate debates, resulting in the emergence of concepts such as environmental justice and climate justice (Schlosberg, 2013). Subsequently, energy justice has entered the social science research agenda. Although it is a relatively new term, it has widely been used to analyse energy systems and to address related concerns from production to consumption (Heffron and McCauley, 2014; Jenkins et al., 2016; McCauley et al.,2013; Sovacool, 2013; Sovacool and Dworkin, 2014; Sovacool and Dworkin, 2015; Sovacool et al., 2013).
The two known approaches to define energy justice are 1) the three dimensions of energy justice as (McCauley et al., 2013) and 2) the energy justice principles (Sovacool et al., 2016). In the article by McCauley et al. (2013) the three dimension or tenets of energy justice are for the first time discussed in detail (Heffron and McCauley, 2017).

In 2016, a conceptual review on energy justice was published by Jenkins et al. (2016). In this paper, the three dimensions are further explained and elaborated on. According to Jenkins et al. (2016), energy justice is comprised of 1) *distributional justice* (the allocation of costs and benefits among stakeholders),

2) *recognition-based justice* (the recognition of the misrecognized in society and the respectful treatment of opposed voices) and 3) *procedural justice* (e.g. inclusiveness and transparency of procedures). Thus, they see energy justice as a way to evaluate where injustices emerge, to examine who is affected and to study which processes can reduce unjust outcomes (Jenkins, et al., 2016). The three dimensions of justice are interwoven and interlinked as exemplified by the recognition of vulnerable groups in conjunction with their integration into policy making, for instance.

In 2016, Sovacool et al. introduced the eight design principles for energy justice, which were complemented with two other principles by Sovacool et al. (2017) (see Table 2-1.). These principles aim to guide research but also to translate the concepts from justice and ethics into energy decision-making (Sovacool et al. 2016).

In this study, it was chosen to base the evaluation framework on the three dimensions of energy justice as they are more comprehensive and therefore capture the questions of the what, the who and the how of the energy transition. For this reason, the paper of Jenkins et al. (2016) is used as the main article to define energy justice and develop the evaluation framework. At the same time, the energy justice design principles are used to ground the policy recommendations in the last part of this study.

Table 2-1. Energy justice principles (Sovacool et al., 2017, p.41 & 42).

Nr	Principle	Descirption
1	Availability	People deserve sufficient energy resources of high quality.
2	Affordability	All people, including the poor, should pay no more than 10% of their income for energy services.
3	Due Process	Countries should respect due process and human rights in their production and use of energy.
4	Transparency and accountability	All people should have access to high-quality information about energy and the environment and fair, transparent, and accountable forms of energy decision-making.
5	Sustainability	Energy resources should not be depleted too quickly.
6	Intragenerational equity	All people have a right to fairly access energy services.
7	Intergenerational equity	Future generations have a right to enjoy a good life undisturbed by the damage our energy systems inflict on the world today.
8	Responsibility	All nations have a responsibility to protect the natural environment and minimize energy-related environmental threats.
9	Resistance	Energy injustices must be actively, deliberately opposed.
10	Intersectionality	Expanding the idea of recognitional justice to encapsulate new and evolving identities in modern societies, as well as acknowledging how the realization of energy justice is linked to other forms of justice e.g. socio-economic, political and environmental.

2.2 The dimensions of energy justice operationalised

In the energy justice literature, the variables and indicators related to the distributive, recognition-based and procedural dimensions are selected. These variables and indicators are complemented with findings from scientific literature on energy transition and subsequently, operationalised and presented in the evaluation framework (see Table 2-2). In doing so, sub-question two can be addressed: 'How can the

three justice dimensions of distributive, recognition and procedural, based on literature, be operationalised?'.

2.2.1 *Distributive justice*

Distributive justice concerns the allocation among stakeholders of costs and benefits resulting from changes in the energy system. In this study, this dimension is translated into the different impacts the opening and closure of an energy system can have on relevant stakeholders.

Here it is important to look beyond traditional economic indicators such as the GDP as these often overlook several social and environmental impacts. The article by Del Río and Burguillo (2008) provides a comprehensive overview of the different impacts the deployment of a clean energy project can have at regional and local level. These insights are complemented by the article by Jenkins et al (2016) and Bouzarovski and Simcock (2017), especially in relation to energy related impacts. Additionally, insights from the literature on the impacts of coal phase-out are added (Brauers, et al., 2018; Fothergill, 2017; Galgóczi, 2014).

1. *Quantitative and qualitative impacts on employment*

Included in the evaluation framework are the quantitative impacts on employment as the opening and closing of an energy system often results in changes in employment (Del Río and Burguillo, 2008).

Taking coal phase-outs as an example, negative quantitative impacts on employment are expected, as the workers lose their jobs when mines and coal power plants close. In the case of the deployment of renewable energy sources, the employment impacts depend on the renewable energy technology and the stage of the installation process. Overall, wind farms are the most likely to have the biggest effect on employment (Del Río and Burguillo, 2008). Additionally, it is important to be aware of indirect employment changes (e.g. equipment suppliers). However, indirect employment changes are difficult to measure.

Del Río and Burguillo (2008) also discusses qualitative impacts, such as the difference in job opportunity or security in relation to gender and different skills and educational levels. In some case-studies it was found that ex-workers from the coal industry often suffer from skills shortages and this is partly due to a lack of educational opportunities in many areas (Caldecott et al., 2017).

2. *Income generation impacts*

The opening or closure of an energy system will have an effect on the income certain groups. In the case of the opening of an energy system, the most evident impacts will be those resulting from newly generated revenues for the investors and the energy operator. The landowner who receives remuneration from the energy operator will also notice a considerable personal income impact (Del Río and Burguillo, 2008). The municipality may also receive compensations for the installation of a wind farm. Additionally, more economic activities lead to higher taxes which can be channelled back into the community or region (Del Río and Burguillo, 2008). Lastly, the EU, national or regional governments may grant funds for the development of clean energy projects to communities.

Workers affected by a coal phase-outs will most likely lose some of their income. Therefore, the level of labour income and the conditions under which such individuals find new employment need to be considered as they might be lower. Furthermore, local communities are affected as they lose tax revenues following the closure of mines and power stations (Galgóczi, 2014). The energy operator will

also lose revenues and additionally, need to offer a redundancy package to its employees and finance the decommission of the plant (CE Delft, 2019).

Related with income effects is the distribution of income among the society. The opening and closing of the energy systems may result in changes in income inequality (Grösche and Schröder, 2014; Neuhoff et al., 2013; Schlör et al., 2013).

3. *Economic diversification impacts*

When an area's main income source is from agriculture, for instance, the implementation of clean energy projects can diversify the local economy (Del Río and Burguillo, 2008). This reduces the dependency on one stream of income. The effect of this really depends on the magnitude of the project(s).

The closing of a mine or coal power plants can have severe impacts if there is regional economic dependence (Brauers, et al., 2018). However, the closing forces an area to diversify the economy to alleviate the negative impacts (Galgóczi, 2014).

4. *Innovation and educational impacts*

In some cases, changes in energy systems can lead to change in R&D. However, in case of a local RES deployment, this effect will be limited. The educational effects are likely to be higher as local workers are trained and obtain new skills (Del Río and Burguillo, 2008). Moreover, when looking at coal phase-outs, employers sometimes offer training and education to workers, so that they are better equipped for the labour market (Fothergill, 2017).

5. *Energy related impacts*

Rural areas generally are not self-sufficient in their energy supply. Clean energy projects increase the share of self-produced electricity, which lowers their imports and dependence on other suppliers, thus increasing the security of their energy supply (Del Río and Burguillo, 2008). In some situations, communities can export a share of their energy production or buy cheap electricity from energy operator as part of the compensation (Del Río and Burguillo, 2008). It therefore depends on the ownership of the plant and the access to the grid.

However, at national level, the phase out of coal can have consequences for electricity consumers since electricity prices may increase due to less energy supply on the grid (Fothergill, 2017). This especially affects the lower income deciles as they need to spend a greater amount of their income on energy which may lead to energy poverty (Bouzarovski and Simcock, 2017). Moreover, closing of an energy system can have an impact on the security of energy supply, which is seen in this study as the availability of and access to energy for all consumers at all times (Asif and Muneer, 2017).

6. *Demographic and tourism impacts*

Increased employment in rural areas through the implementation of RES can lower urban migration and increase migration to rural or less dense areas (Del Río and Burguillo, 2008). Additional impacts can be felt on tourism. This impact occurs when the clean energy projects is perceived as a pioneer example. This 'demonstrative effect' attract visitors which lead to an additional income source for the community.

The opposite accounts for coal phase-outs which may lead to immigration and devaluation of the region. After decommissioning, sites need to be restored and new infrastructure is required. However, the decommissioning can take up several years (Galgóczi, 2014).

7. *Social cohesion*

RES deployment may improve the socioeconomic prospects which made that people feel more connected to the community or region (Del Río and Burguillo, 2008). Moreover, when revenues are recycled back in the community, people feel rewarded which increases the social cohesion.

In an article by Johnstone and Hielscher (2017) it is argued that coal phase outs reconfigure community cohesion and social networks. However, they acknowledgement that there is a need for more understanding on how phase outs are experienced 'on the ground'.

2.2.2 *Recognition justice*

The recognition-based dimension of justice focusses on misrecognised social groups in society and concerns related to the respect (or lack thereof) given to different identities in social, cultural, and political relations (Bouzarovski and Simcock, 2017). Injustice as 'non-recognition' is introduced by Fraser (1995) where the needs or circumstances of certain groups are not identified or are ignored. The categories under recognition justice are derived from the main article of Jenkins et al. (2016). In this article, a distinction is made between (1) the recognition of ignored groups in society, among which are most important vulnerable groups, and (2) the misrecognition and disrespect of local opinions.

1. *Recognition of the ignored groups in society*

Policies for the deployment RES or the phase-out of coal might overlook the impact on vulnerable groups such as low-income households, the chronically ill, elderly people and the youth. As touched upon previously, the closing of coal plants may increase energy prices which may be problematic for these groups as a higher percentage of their expenditure needs to be allocated to energy. The concept of energy poverty has entered the political discourse in many MSs, but there is a difference in dominance and priority among the MSs (Bouzarovski and Simcock, 2017). Thus, part of recognition justice is that policy recognises the specific needs of particular social groups (Jenkins et al., 2016).

Moreover, repayments or retraining may alleviate the distress of laid off workers from the coal industry, but these policies do often not extend to the community in which these workers are embedded (Stevis and Fellis, 2016). Policies should take into account all affected parties, especially the vulnerable groups.

2. Misrecognition and disrespect

Recognition justice also concerns the power relations between affected groups and the way different opinions and voices are treated. The deployment of a wind park can raise different issues among the local citizens, for instance. Investors and developers tend to disregard campaigns against wind farms as 'not-in-my-backyard' (NIMBY) protests by self-interested and misinformed citizens (Jenkins et al., 2016). Developers assume a social and knowledge gap between global and local perceptions and see the NIMBY phenomenon as a reflection of this. This strategy of undermining local voices and refusing open discussion and compromise, is seen as injustice (Jenkins, et al., 2016).

2.2.3 *Procedural justice*

Where recognition justice focusses on the ignored and disrespected groups in society, procedural justice focusses on how to include these groups so that injustice is reduced (Jenkins et al., 2016). The procedural dimension stipulates that the process is equitable, and stakeholders are engaged in a non-discriminatory way (Bullard, 2005; Walker, 2009).

1. *Inclusiveness and participation in decision making*

   Decision making should include all relevant stakeholders. Moreover, the contribution of each stakeholder should be taken seriously throughout the process (Heffron et al., 2015). However, Miller et al. (2015) argues that many energy policy processes fail to include the public in decision making and claims that when the participation of affected groups is limited, acceptance will be lower.

2. *Mobilising of (local) knowledge and information supply*

   To increase participation and engagement, information and knowledge mobilisation is essential (Jenkins et al., 2016). This notion is especially relevant when local communities (e.g. indigenous people) have extensive knowledge about the environment and are heavily dependent on local ecosystems. In these cases, early consultation processes and engagement in decision making is pivotal to the success of the RES project (Jenkins et al., 2016). Informing local communities can help to gain more support for energy projects or the closure of a coal plant as the lack of information can create resistance.

3. *Transparency in decision making*

   Decision making should be transparent, disclosing full information by governments and industries (Heffron et al., 2015). This implies that reports (e.g. environmental impact reports) should be timely available and easily to access, for instance. Moreover, the public should be informed about the different subsidies for energy sources (McCauley et al., 2013). Thus, information should also be available and easily accessible for the general public.

4. Representations in institutions

   Closely related is the equal representation of gender and ethical minorities in institutions (Jenkins et al. 2016). Nowadays, there is unequal representation in a wide range of institutions including businesses, local, national and international governmental bodies, as well as non-state actors, which impacts the decision-making processes. A more balanced representation of society in institutions leads to a more proactive approach for achieving justice, rather than depending upon the response of affected communities to injustice (Jenkins et al., 2016).

In conclusion, by combining literature on energy justice and literature on energy transitions, the key variables and their indicators of the three justice dimensions have been identified. In the table below the evaluation framework is presented. Since current literature provides for a few key variables no guidance on the operationalisation, some sub-indicators need to be further specified in empirical research. However, all key variables and indicators are based on scientific literature and referenced in Table 2-2. The orange coloured rows indicate that the key variables are derived from energy justice literature. No colour implies that the variable originates from literature based on the energy transition.

Table 2-2. Evaluation framework.

Dimension	Key variable	Indicator	Sub-indicator	Main sources
Distributive 	Quantitative employment impacts	Changes in employment	The number of (in) direct created or destructed jobs/changes in unemployment rate	Caldecott et al., 2017 & Del Río and Burguillo, 2008
	Qualitative employment impacts	Gender equality: job opportunity and job security	The number of new jobs that are allocated to women versus men/ job tenure woman versus men/special attention given to gender aspects in employment	Del Río and Burguillo, 2008
		Skill- and education level: job opportunity and job security	The number of new positions that are suited for low educated versus high educated/ job tenure for high versus low educated workers	Del Río and Burguillo, 2008 & Caldecott et al., 2017
	Income impacts	Income impacts for the region	Changes in GDP for the region	Del Río and Burguillo, 2008
		Income impacts for the municipality	Changes in income for the municipality	Del Río and Burguillo, 2008
		Labour income impacts	Changes in labour income	Del Río and Burguillo, 2008
		Personal income impacts	Changes in personal income	Del Río and Burguillo, 2008
		Income inequality	Changes in income inequality (as indicated by the Gini coefficient)	Grösche and Schröder, 2014; Neuhoff et al., 2013 & Schlör et al., 2013
	Economic diversification	Impacts on local economy	Changes in the economics sectors of the region	Del Río and Burguillo, 2008 & Galgóczi, 2014
		Dependency on one sector/energy sector	Reduced or increased dependency on the energy sector as an income source for the region	Del Río and Burguillo, 2008 & Brauers et al., 2018
	Innovation and education impacts	Impacts on technology development	Changes in technology development	Del Río and Burguillo, 2008
		Impacts on education system	Changes in education system	Del Río and Burguillo, 2008 & Fothergill, 2017
	Energy related impacts	Impacts on self-sufficiency in energy/decentralised energy production	Changes in households' self-sufficiency in energy/changes in decentralised energy production	Del Río and Burguillo, 2008 & Fothergill, 2017
		Impacts on affordability	Changes in energy prices for consumers	Bouzarovski and Simcock, 2017 & Jenkins et al. 2016
			Changes in rate of energy poverty	Bouzarovski and Simcock, 2017 & Bouzarovski and Tirado Herrero, 2017
		Impacts on energy supply security	Changes in security of energy supply e.g. changes in import dependency	Asif and Muneer, 2017
	Demographic and tourism impacts	Migration impacts	Changes in the number of people moving in or out of the region	Del Río and Burguillo, 2008
		Tourist impacts	Changes in the number of tourists	Del Río and Burguillo, 2008
	Social cohesion	Impacts on collective feeling	The community experience changes social cohesion	Del Río and Burguillo, 2008 & Johnstone and Hielscher, 2017
Recognition 	Recognition of vulnerable groups: youth, elderly, people with distance to the working place and	(Special) attention for vulnerable groups in energy transition	Recognition by policymakers that vulnerable groups in the energy transition should be included	Fraser 1995 & Jenkins et al., 2016
		(Special) attention for energy consumption of vulnerable groups	Recognition by policymakers that these groups might need more than the average energy consumption of households	Bouzarovski and Simcock, 2017 & Jenkins et al., 2016

	low-income households	(Special) attention for energy poverty in the energy transition	Recognition by policymakers that low income households are prone to or in energy poverty	Bouzarovski and Simcock, 2017
	Respectfully treated	Governments and energy companies' value other (local) opinions and treat people with respect	Ideas and arguments against the changes to the energy system are (un)heard	Jenkins et al., 2016
			Locals and environmental NGO's indicated that they feel treated (dis)respectfully	Jenkins et al., 2016
Procedural 	Inclusiveness	Relevant stakeholders are involved	All relevant stakeholders were included	Jenkins et al., 2016 & McCauley et al. 2013
	Participation	Participation in decision-making process	Workshop and input sessions were organised where stakeholders could participate in decision making	Heffron et al., 2015
		Altered decision making	Arguments against or in favour of the creation/destruction are feed in the decision-making process	Jenkins et al., 2016
	Mobilisation of knowledge/and information supply	Knowledge about the topic is provides	Informative websites and information sessions are offered, to provide the general public with relevant knowledge	Jenkins et al., 2016
			People indicate that they understand the topic	Jenkins et al., 2016
	Transparency	Availability of information	Notes of important meetings are publicly available and reports such as environmental impact report are available	Heffron et al., 2015
		Easy accessibility of information	Information is easy to find on National/local governments' websites and companies' websites	Heffron et al., 2015
	Representation in institutions	Equal representations of society	Decision-making bodies have an equal representation of society (e.g. inclusion of women and minority members)	Jenkins et al., 2016

3. Methods

This research is designed around the main question: What are relevant metrics to assess energy justice and what governance practices have demonstrated a positive contribution to energy justice? In the Figure below an overview is given of the different methods to answer the research questions.
The first two sub-questions were concerned with literature review. As this part of the study is already executed, it is not discussed in further detail. The remaining sub-questions and their accompanied methods are discussed in detail below.

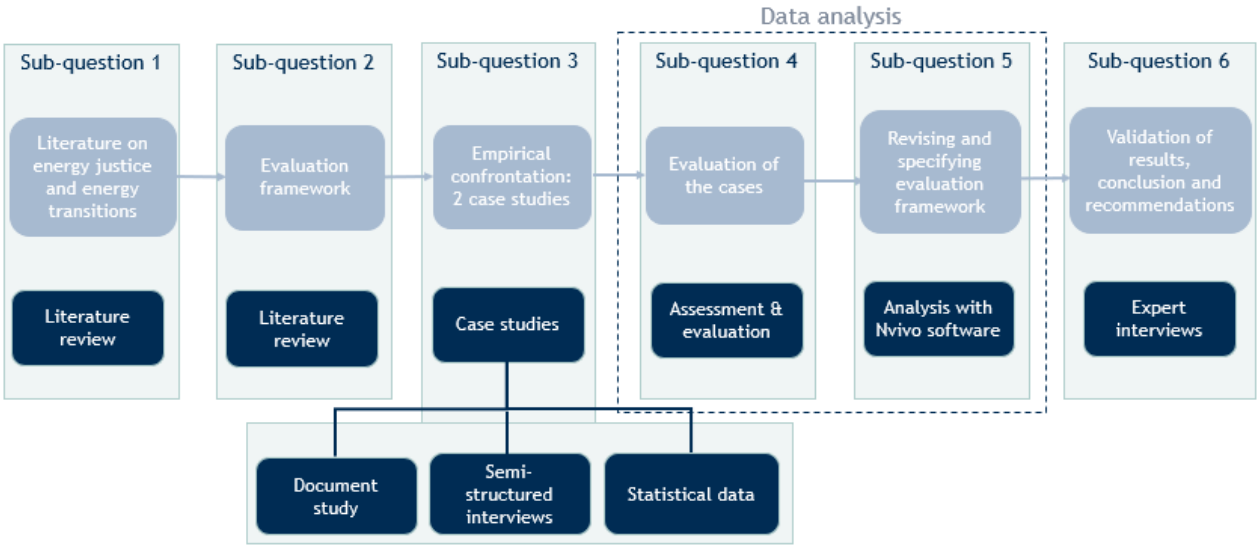

Figure 3-1. Overview of the study's methodology

3.1 Research strategy

Due to the explorative nature of this study, a case study analysis was selected as it enabled an intensive study of a single unit which resulted in a greater understanding of justice implications of the energy transition (Gerring, 2004; Verschuren and Doorewaard, 2010). Consequently, the case study analysis enabled the evaluation of the cases' performance on energy justice, so that lessons could be drawn on the best applicable governance practices. In addition, the case study analysis allowed for an empirical confrontation which enabled the revision and specification of the evaluation framework.

3.2 Case selection

3.2.1 *Selection criteria*

The cases for the case study analysis were selected based on five criteria:

1. **Successful energy transition by achieving targets for renewable energy shares or phase-out of coal.** The cases selected needed to be widely progressed in the energy transition so that impacts of the energy transition on the three dimensions of energy justice could be measured and best practices could be identified. The cases were perceived as successful as indicated by e.g. new articles about meeting energy targets and renewable energy prizes and awards that the cases had won in the past.
2. **Assumed success in achieving energy justice**. The cases were selected based on their assumed success in achieving energy justice. It was chosen to first learn from successful cases to get an idea of

what a just transition could entail. In other words, to create a benchmark for energy justice and just transitions. To find assumed successful cases it was broadly assessed whether some variables of the energy justice dimensions were present e.g. reduced income inequality, inclusiveness in decision making. Moreover, a broad assessment of effective (energy) policies in realising an energy justice was done.

3. **Different institutional and energy related context.** The cases were chosen on their different energy contexts and institutional arrangements to maximise the variety of findings. For this reason, the cases are not compared, but solely used to enrich the evaluation framework and to learn about different governance practices that can increase energy justice.
4. **Regional or local level**. The cases selected were on regional and local level to capture the details needed to gain better understating of how the different dimensions of justice work in practice. Moreover, the evaluation framework consists of several indicators (e.g. transparency) for which data is most sophisticated on regional and local level.
5. **Completed project.** The cases selected need to be completed so that impacts are known and reflected in data banks such as Eurostat.

3.2.2 *Number of cases*

Two cases were analysed; one covering the transition towards renewable energy productions and one covering the phase out of coal. Although more cases would have enriched the findings even more, two cases were enough for the aim of this study. The choice for two cases was also based on time restrictions since roughly ten interviews were conducted per case to include the voices of important actors e.g. the local authorities, representatives of the community and, depending on the case; project developers, employees from wind parks or coal power plants, directors and managers of coal power plants.

Due to the explorative nature of this study, it was chosen to examine two cases in detail rather than more cases on a more superficial level, to truly learn how the evaluation framework would work in practice and to gain a deeper understanding of the best governance practices in realising energy justice. Consequently, the cases were not compared with each other as it was chosen to apply the most different case-study design (Burnham et al. 2008) to maximise the variety of findings (see selection criterion 3).

3.2.3 *Selected cases*

Based on selection criteria, the cases of Burgenland, Austria and Engie, Nijmegen (the Netherlands) were selected out of the eight broad assessed cases (see Annex A).

Case 1: Burgenland, Austria

The case-study of Burgenland, Austria, illustrates a successful regional example of the roll-out of renewable energy generation. In 2006 local politicians announced the target of 100% electricity self-sufficiency by 2013. This triggered the installation of 332 wind turbines with a total capacity of 755 MW (IG Windkraft, 2013). At the end of 2013 the province's electricity production exceeded its demand, reaching self-sufficiency (COR, 2019). Moreover, up to 40% of the electricity produced within the region was exported to Vienna (Wind Europe, n.d.). The region is therefore seen as a pioneer and an example in clean energy transitions, winning the Solar Prize in 2010 (Otzipka, 2010).

Case 2: Engie Nederland, Nijmegen, Netherlands

The decommissioning of the Gelderland 13 (G13) coal power plant is an example of successful coal phase out, where the negative impacts on the region such as unemployment and energy dependency were reduced. The coal plant is located in the city of Nijmegen, one of the largest cities of the province of Gelderland. Moreover, after the closure in 2015, the energy company, Engie Nederland, decided to transform the site into a clean energy hub with solar panels and wind turbines. The redevelopment of the G13 site will help Nijmegen reach their energy neutral goal in 2050 as it has already helped the city win the Green Capital 2018 (Green Capital Nijmegen, 2018). Although this redevelopment has not yet completed, it was decided to take this as 'sub-case' as it shows an interesting process from phase-out to redevelopment. As the redevelopment is not yet completed, only recognition justice and procedural justice were assessed, leaving out distributive justice.

3.3 Data collection

In order to both evaluate the cases on their performances on energy justice and specify the evaluation framework, different methods and a combination of qualitative and quantitative data was required.

3.3.1 *Document study*

First a document study was done to map out the different drivers and the energy policies at national and regional level. These were policy documents, energy strategies and impact reports. Also, more social policies were examined to learn about financial support for low income households in relation to the energy transition. The objective of the document study was not only to get an overview of the policy package in place, but also to get more background information on the case and to find important documents that would support the evaluation e.g. a letter from Engie in which they respond to a worried council member.

3.3.2 *Semi-structured interviews*

Based on the document study, a preliminary stakeholder analysis was done to select the relevant interviewees. Moreover, while conducting the interviews, it was asked to the interviewees if they thought it was important to talk with other stakeholders which led to the addition of a few interviewees. These two approaches made that overall, a wide variety of stakeholders were interviewed (see Annex B).
The interviews were semi-structured and conducted by the use of an interview guide (see Annex C). The interview questions were based on the identified key variables and indicators of the three dimensions of energy justice as discussed in the literature. Questions were formulated as open as possible so that interviewees would not be influenced by the question and would answer the question according to what they thought that was the most important. Ethical concerns were taken into account by anonymising the interviewees and asking for their consent to record the interview.

It is important to note that there was a difference between the Austrian interviews and the Dutch interviews, as the former were conducted via skype and the latter face to face. This may result in more observations and therefore a greater level of detail for the Dutch interviews. Additionally, the Dutch interviewees were able to express themselves better as they can speak in their native language. To make up for these flaws, the Austrian case was supplemented with data from previous case-studies on Burgenland. This was possible as this case is rather famous and several interviews with important

stakeholders are online and translated. However, these studies were not focusing on energy justice, so being aware of this limitation in the data collection was important during the data collection process.

3.3.3 *Statistical data*

Some of the key variables or indicators could not be answered by qualitative data e.g. income inequality. Therefore, quantitative data sources were consulted. Moreover, for many other indicators it increased the internal validity to complement some qualitative findings by adding quantitative data. For instance, based on the interviews, it was known that there were impacts on tourism. However, to learn the exact numbers, it was needed to consult Burgenland statistics. As the case of Burgenland was on regional level (NUTS 2) and the Engie case on local level (NUTS 3), statistical data was mostly available for the Burgenland case.

3.4 Data processing

3.4.1 *Evaluation of the cases*

The evaluation of the cases was done by first collecting both qualitative and quantitative data for the different indicators. Next, the indicators were assessed based on a scoring system. The different indicators under the three dimensions could score:

- Positive or high: which means that there was a positive or high impact;
- neutral or medium: which implies that the impact had neither a positive nor negative effect;
- negative or low which indicates that the impact had been negative or low;
- blanco, as there was not enough information to score the indicator on its performance.

The scoring was based on the researcher's interpretation of the data. In each scoring section, scores were explained and argued.

3.4.2 *Revising and specifying the evaluation framework*

In order to answer sub-question 5, the interview data was processed by using Nvivo coding software. All indicator derived from scientific literature were translated in nodes. Based on the density of nodes it was assessed how important interviewees found certain indicators. In addition, Nvivo enabled to trace down information mentioned by the interviewees that was not yet labelled as a node, without missing any information. Subsequently, the newly created nodes were added to the evaluation framework. Although the density of the nodes could indicate the importance of a key variable or indicator, it was chosen not to give different weights between and within the different dimension of justice. This reason for this is that number of interviews was too low to generalise the findings.

3.5 Validation and recommendations

To triangulate the results for the revised evaluation framework and the best practices, expert interviews were conducted with three experts in the field of energy justice (see Textbox.1). In these interviews the findings were discussed in detail and it was discussed how they relate to current discussions around energy justice.

The first expert interviewed was Dr. Benjamin Sovacool who has published many articles about energy justice, several of which are cited in this study such as the Sovacool et al. (2016) where the energy justice principles are introduced. The second expert is Dr. Kirstin Jenkins. The evaluation framework operationalised in this study was based on the article by Jenkins et al. (2016). She is therefore seen as one of the key authors for this study. The last expert interview is Dr. Dimitris Stevis, who has a slightly different perspective on energy justice as it is more focused on labour implications, which enriched the findings.

Dr. Benjamin Sovacool is a Professor of Energy Policy at the Science Policy Research Unit (SPRU) at the University of Sussex Business School in the United Kingdom. He is both researcher and consultant on issues pertaining to energy policy, energy security, climate change mitigation, and climate change adaptation (University of Sussex, 2019).

Dr. Kirstin Jenkins is a Lecturer in Human Geography and Sustainable Development in the School of Environment and Technology (SET) at the University of Brighton in the United Kingdom. Her research interest is in energy and the social justice issues created by its production and use (Elsevier, 2019).

Dr. Dimitris Stevis is a Professor at the Department of Political Science, Colorado State University. He concentrates his research around social governance of the world political economy in the areas of labor and the environment, with particular attention to social power, justice and local/global dynamics (Colorado State University, n.d.).

Textbox 1. Background of the experts interviewed

Lastly, the best practices have been determined inductively based on the findings of the evaluation (Bowen, 2006). Subsequently, the first steps towards the formulation of policy recommendation were taken. To ensure the recommendations were robust, each recommendation was embedded in literature.

4. Description of the cases

4.1 Background information on Burgenland, Austria

4.1.1 *Introduction*

The case of Burgenland illustrates the successful regional roll-out of renewable energy generation. Before the energy transition started, Burgenland had a real peripheral situation, with a lack of urban amenities, which resulted in the region being an emigration hotspot for decades (EC, n.d.). Traditionally, Burgenland's main economic sectors are agriculture and viniculture. Since 2006, clean energy is

Image 1. Map of Burgenland. Source: Steichen, 2013

a growing sector, together with, ICTs and tourism (see Textbox 2 for more information) (EC, 2019c).

In 2000, the indigenous renewable energy share was 3% (Energy Cities, n.d.), however, in 2006 regional politicians announced the target of 100% electricity self-sufficiency by 2013. This goal was reached within the set time and electricity was even exported to Vienna (Wind Europe, n.d.). Nowadays, Burgenland's renewable power mix consists mostly of wind, biomass and solar energy (Go100%, 2019).

Burgenland is the most eastern province of Austria and is the smallest of the nine states of Austria. In terms of population, it is the least populous with 291,942 people in 2017, accounting for 3.3% percent of Austria's population with a population density of 74 habitants/km^2 (EC, 2019c). Burgenland's capital is Eisenstadt with a total of 14,241 inhabitants. The landscape consists of numerous mountains and forests. The region is known for its protected nature areas and ski resorts (WWF, 2014). Almost one third of the Province consists of protected areas, especially Burgenland North is a biodiversity hotspot, mainly for birds and bats.

Textbox 2. General information on Burgenland

4.1.2 *Drivers of the energy transition*

In this study, the start of the transition is marked around 1993's when the first wind measures were conducted. The end of the transition is set in 2013 when Burgenland reach its target of 100% self-sufficiency in their electricity use. However, it could be argued that the transition started earlier or is still ongoing.

In this section, the events and policies that triggered the transition are discussed chronologically and are summarized in Figure 4-1.

High potential for wind, biomass and solar energy production

In 1993, it was discovered that the north of Burgenland had a high potential for wind energy, 30% greater than expected (Interviewee 2, Personal Communication, May 2, 2019). In close cooperation with the municipal government of Zurndorf, the first wind turbines were built in 1997. The project showcased the profitability of wind energy in the North of Burgenland. Meanwhile in the south of Burgenland, the town of Güssing explored its potential in producing biomass energy. The abundant agriculture waste and forestry made the business case interesting.

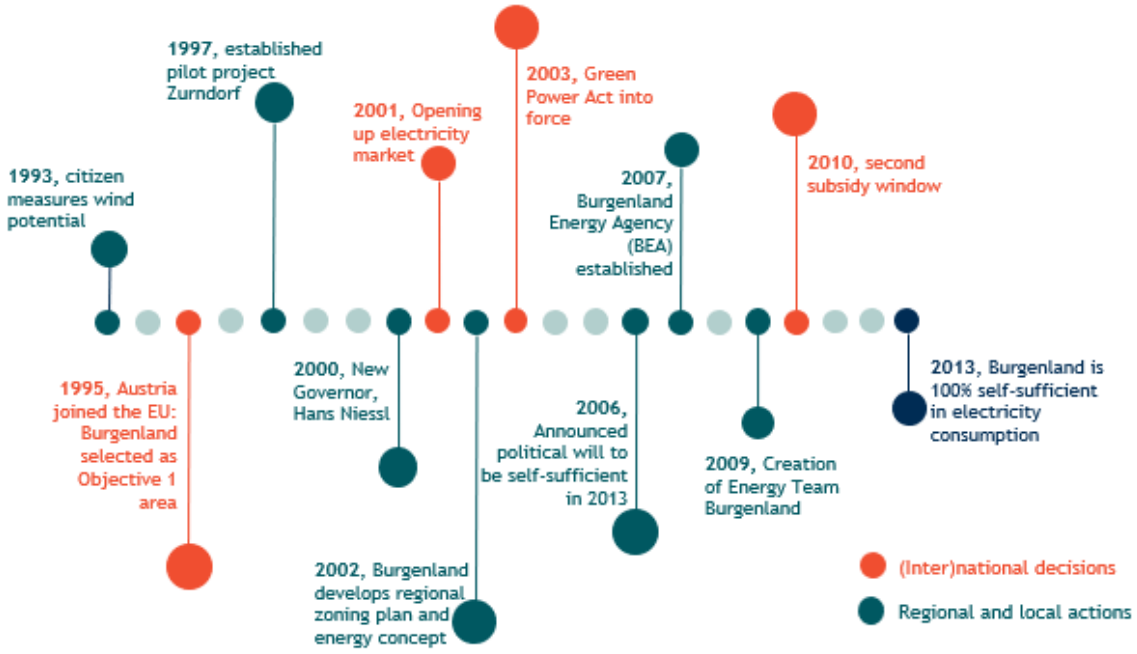

Figure 4-1. Timeline of the most important events in the case of Burgenland

Burgenland selected as Objective 1 area

In 1995, Austria joined the European union and from then on Burgenland was eligible for Objective 1 of the European Structural Funds (ERFD), a fund created to boost economic development in rural regions that lag economically behind (EC, 2004). Burgenland received support from 1995 to 1999 and 2000 to 2006 (RMB, n.d.). As one of the conditions, Burgenland had to hand-in a regional development plan wherein they choose to focus on two sectors; renewable energy and tourism, with a focus on synergies between these sectors (Interviewee 2, Personal Communication, May 2, 2019). From 2007-2013, Burgenland also received ERDF co-funding (Under the framework of the "Convergence Phasing-Out" objective) to support competitiveness and innovative regional economic structures (COR, 2019). From 2000 to 2013 the total of grants and funds allocated to Burgenland were worth in total € 993.2 million (RMB, n.d.).

Goals to improve economic situation and combat climate change

As Burgenland was a region that was economically lagging behind, the choice to focus on renewable energy deployment was a strategic decision as it would create employment and transform the province in an energy technology hub (Burgenland, 2013). Another driver was to mitigate climate change by reducing Burgenland's CO2 emissions and air pollution (Interviewee 1, personal communication, May 13, 2019). In addition, it was an aspiration of Burgenland to increase their indigenous renewable energy production. This goal was especially supported in 2000 by the installed governor.

Changes in the subsidy system

In 2001, the electricity market opened up which enabled all power producers to connect to the grid which increased competition in the energy market (IEA, 2019). In 2002, the Green Electricity Act (GEA) was adopted which provided the support for renewable electricity production in the form of guaranteed prices (€ 7.8 c.t / kWh) for the next 13 years (IEA, 2019). The GEA, enforced in January 2003, harmonised Austria's subsidies system and led to the first wind turbine installation window. This first subsidy window lasted until 2005, when the regulations changed again (Interviewee 3, personal communication, May 7, 2019). The second window started in 2010, as the result of changes in the GEA, and lasted till 2013 (Interviewee 6, personal communication, May 22, 2019). In 2010, the feed-in tariff, was set at € 9.7 ct / kWh, which enabled the second rush of installations (Energie Burgenland, 2014).

Regional zoning plan and energy strategy

To coordinate the first installation rush, the provincial government developed the regional zoning plan to select areas which are favourable for wind energy production (Örök, 2005). This selection process was done with many stakeholders such as Bird protectors, environmental NGOs, spatial planners, etc. Areas excluded were bird nesting- and Natura 2000 areas, for instance. In total 10% of the total planning area was declared as suitable for the installation of wind turbines (Örök, 2005). In 2003 the first 'energy concept' was established, a strategy to achieve more energy efficiency, energy savings and produce more renewable energy. Already at this stage the provincial government tried to integrate all relevant sectors, except for transport (Burgenland, 2013).

Political will to achieve 100% self-sufficiently in electricity

After the first installation rush, the interest of the provincial government and private companies in renewable energy grew. In 2006, experts estimated that Burgenland would be able to reach electricity

self-sufficiency by 2013 (Energy Cities, n.d.). This ambitious goal was adopted by the provincial government and was supported by all the political parties (WWF, 2014).

4.1.3 *(inter)national policies*

In this sub-section, several policies that illustrate the institutional and energy related context of Austria are discussed. These policies are complemented with policies that promote energy justice and will be used in the evaluation of this case.

European union: regional development and energy policies

First of all, the European Union's renewable energy directive (RED I) (2009/28/EC) stipulates the targets for the MSs which need to be achieve by 2020. These targets include:

- reduce GHG emissions by 20% from 1990 levels;
- raise the share of total energy consumption produced from renewable energy sources to 20%;
- increase energy efficiency by 20% (EC, 2009).

National energy policies

Based on the RED I, Austria's National Renewable Energy Action Plan (NREAP) was developed. The NREAP sets the overall trajectory to meet the directive's targets. In this plan, Austria needs to increase its share of renewable energy in gross final consumption of energy to 34 % by 2020 (NREAP-AT, 2010). In the 2005 base year, Austria has a renewable energy share of 24.4 %. In 2014, Austria is only 1% away of meeting its 2020 target (See Figure 4-2). Austria's trajectory by 2020 therefore clearly lies above the targets set by the directive. The high share of renewable energy share is partly due to the large amount of hydropower (83%) in Austria, followed by solid biofuels (7.5%) and wind energy (6.1%) (Eurostat, 2017). Moreover, the Austrian Energy Strategy 2010, focuses on increasing energy efficiency, promoting and intensifying renewable energy and lastly, guaranteeing energy supply for the long term (IAE, 2010a).

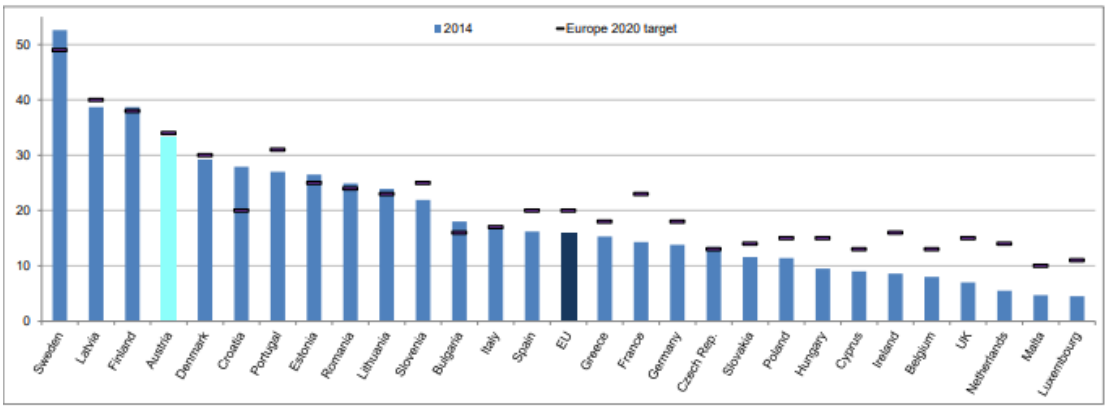

Figure 4-2. Share of energy from renewable sources in the EU Member States, 2014 (in % of gross final energy consumption). The black bar represents each countries NREAP's target. Source: Eurostat, 2016

To achieve these targets, the aforementioned second subsidy system was implemented. Additionally, in Austria, the services costs to connect one's household to the grid network are relatively low (compared to Germany), which reduces the barrier for households to invest in decentralised energy.

To finance the renewable energy subsidy, Austria charges an electricity surcharge (Ökostrom Zuschlag) that households pay on top of their electricity bill. Since 2012, low-income households, pension recipients as well as students and long-term care recipients can be exempted from paying the green electricity surcharge (E-Control, 2012). Households with normal income pay yearly € 80 to € 100 (Interviewee 1, personal communication, May 13, 2019).

Burgenland specific energy policies: recycled wind revenues and heat subsidy

In Burgenland, the wind energy companies must give a certain financial compensation per wind turbine to the municipality as the municipality provides public roads for cables and transport. The financial benefits from the wind energy developers are redistributed into the community by the development of new roads, kindergartens, schools, etc. (Interviewee 1, Personal Communication, May 2, 2019).

For households who are at risk-of-poverty, there is heat subsidy (Heizkostenzuschuss) in Burgenland. The heating subsidy is granted regardless of the type of fuel used. For a low-income household with two parents and one child, the yearly amount of the heating subsidy for 2018 was € 1.497,62 (Land Burgenland, 2019).

4.1.4 *Stakeholders analysis*

The energy transition of Burgenland knows many stakeholders. Each are discussed shortly and presented in the diagram below. An important stakeholder is the **European Union** as they provide the ERDF and other support to the region. The European Union also set the EU (and in some cases national) level targets for renewable energy production, energy efficiency and savings and greenhouse gas reductions. The **Austrian national government** set the national renewable energy targets and the conditions that enabled the transition, such as the Green Power Act. The **Federal state of Burgenland** streamlines its (energy) policies with the national policies. However, in Austria the nine federal states are further independent to develop frameworks and approaches to implement policies or to set more ambitious energy targets (Interviewee 5, personal communication, May 16, 2019). The state of Burgenland is divided into 171 municipalities which have no legislative capacity (EC, 2019c). The state's government is therefore the centre of all negotiations and stakeholder management during the transition.

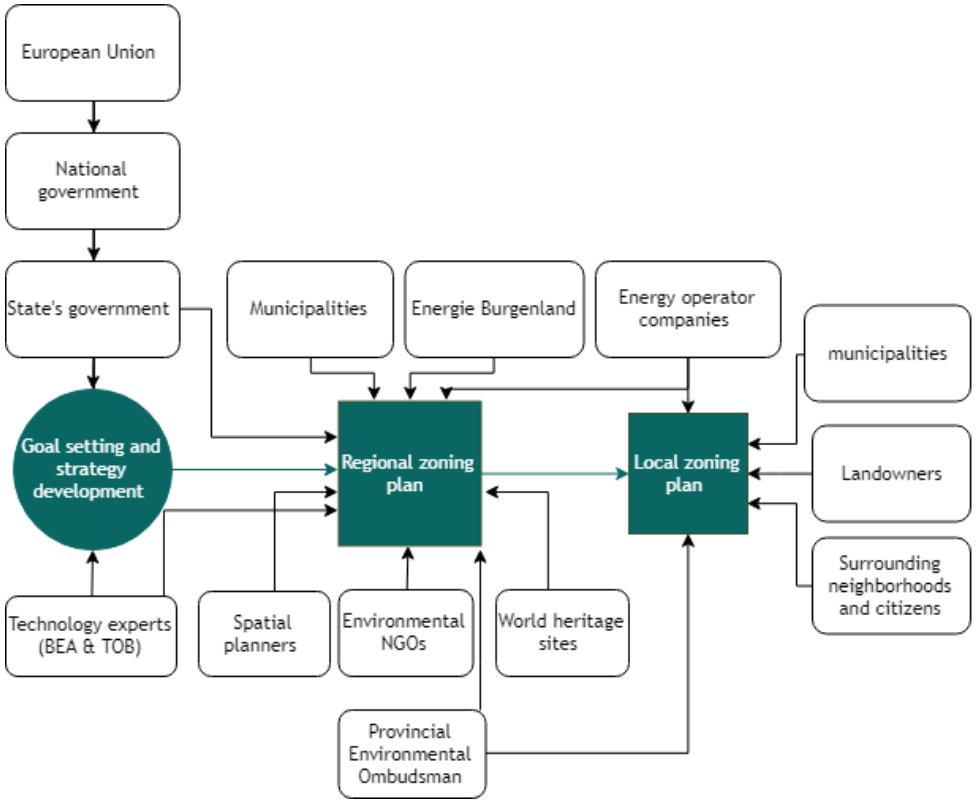

Figure 4-3. Diagram of stakeholders in the Burgenland case. See Textbox 3 for information about the regional and local zoning plan.

The **municipalities of Zurndorf (wind energy) and Güssing (biomass energy)** were one of the first to take up the energy transition and are seen as model municipalities.

The **Institute for Spatial Planning** (Institut für Raumplanung (ÖIR)) was contracted by the province in 2002 to help Burgenland be the first pilot of regional zoning planning. They contributed by defining the criteria to be used for the development of the regional framework concepts for wind power plants (see **Error! Reference source not found.**)(Interviewee 5, personal communication, May 16, 2019). The **Department of Spatial Planning and Nature and Environmental Protection** managed many processes of which the development of the Austrian Spatial Development Concept where they worked closely with the ÖIR (WWF, 2014).

Difference between regional and local wind energy zoning plan: The zoning process for the development of wind parks is split into two stages. The first stage is the regional wind energy zoning process (Regionales Rahmenkonzept für Windkraftanlagen) where at provincial level the zones are determined in which it is allowed to build wind turbines.

The second stage is the local wind energy zoning plan on a municipal level and can only take place within the zones determined at regional level. This zoning plan concerns the respective municipality, wind energy developer, landowner and residents and need to be approved by the municipality before a wind turbine can be built.

Textbox 3. Information on the regional and local wind energy zoning process.

Burgenland Energy Agency (BEA), a State's body responsible for the expansion and promotion of clean energy, including energy projects and strategies as well as energy consulting in Burgenland. In 2007, they worked together with the **Technology Offensive Burgenland** (TOB). The TOB had an advisory role, focussed on research and were involved in several European funding projects. The **energy companies** are

important stakeholders as they invest in and develop the renewable energy sources. The largest private-owned company of Burgenland is Püspök Group which generated 212 MW in 2014. This family company was established in 1997.

In 2002, The **Provincial Environmental Ombudsman** was legally appointed to be 'the independent lawyer of the nature' (Interviewee 5, personal communication, May 16, 2019). Additionally, the **Nature Conservation Authority** is there to supervise the process and to provide professional competence and expertise (WWF, 2014). There are also several **Environmental NGOs** involved among which BirdLife and the WWF who are concerned with the protection of nature and in particular the nesting areas and bird emigration routes. Burgenland also possesses UNESCO heritage sites, such as the region around Lake Neusiedl. Therefore, representatives of World Heritage Sites are involved in the development of the regional zoning plan.

Lastly, the **citizens** of Burgenland are stakeholders as they could be negatively affected with land-changes. A majority can hinder the installation of windmills and to this end, citizens are involved in the local zoning planning (Interviewee 3, personal communication, May 7, 2019). **Landowners** provide the ground for the windmills, so they have the power to prevent an installation.

In conclusion, the Federal State of Burgenland is the most important stakeholder, as it took the lead in the energy transition. However, the favourable conditions set by the national government were necessary to accelerate the transition. In the case of Burgenland, spatial planners played a major role by guiding the regional wind energy zoning. It was distinctive in this case that environmental NGOs and biodiversity experts were involved in wind energy planning. Lastly, the wind energy developers were seen as an important stakeholder, as they executed the installation of wind energy and thereby engaged with the citizens and landowners.

4.2 Background information on Engie, the Netherlands

4.2.1 *Introduction*

The Engie case, demonstrates the whole process of the energy transition on a detailed level as it first demonstrates the successful phase-out of the coal fired plant, Centrale Gelderland 13 (CG13), after which it redevelops the site into a clean energy hub. The plant (see Image 2), owned by energy giant Engie and located in the city of Nijmegen, closed officially in 2015. Engie managed to mitigate the negative impacts for its employees e.g. in the end only two workers did not find a new job.

Image 2. The CG13 site. Source: Google Maps, 2019.

Image 3. The site in the draft version of the spatial vision. Source: Engie, 2019.

In 2019, 8,000 solar panels were installed at the site, and the first draft of the spatial vision was published in which many clean energy initiatives were included (see Image 3).

Since 1936 the plant is located at the Waal river and owned by Electrabel, later known as GDF Suez which recently became Engie Nederland. While it was still in operation, the coal power plant had a production capacity of 585 MW and employed 510 workers (Electrabel, 2006). The site covers around 30 ha and is part of Nijmegen's inner-city industrial area. The site is surrounded by several neighbourhoods, such as Koningsdaal, Waterkwartier (Biezen) and Weurt (See Image 4). The latter is part of the Municipality of Beuningen. See Textbox 4 for more information on Nijmegen.

Image 2. Overview of Engie site and the adjacent neighbourhoods. Source: Google maps, 2019

4.2.2 *Drivers of the transition*

The case of Engie is split into two phases; the closing of the CG13 and the start of the redevelopment of the site. In this section, the events and policies that triggered the transition are discussed chronologically and are summarized in the figure below.

Nijmegen is one of the largest cities of the province of Gelderland, which is located in the central eastern part of the Netherlands. The city is the capital of the municipality Nijmegen which has a population of 176.881 (Gemeente Nijmegen, 2019). Together with Arnhem, the capital of the province, Nijmegen represents an economic region Arnhem-Nijmegen which experienced a GDP growth of 1.3% in 2013 and 1.5% in 2015 (CBS, 2018). Growth engines were the public, health care and private services sectors (Gemeente Nijmegen, 2016). In 2015, the industry sector in Nijmegen was relatively small, supplying 12% of the available jobs in the city (Gemeente Nijmegen, 2016).

Textbox 4. General information on Nijmegen

The Energy Agreement: National decision to close five coal power plants

In September 2013, the government and participants of the Social and Economic Council (SER) reached an 'energy agreement on sustainable growth' (SER, 2013). The agreement strives for a reduction of 80% to 95% of CO_2 emissions by 2050 and 16% renewable energy production by 2030. To this end, five coal fired plants, built in the 1980s, had to be closed. The first three, among which CG13, closed by the first of January 2016 and the remaining two closed two years later.

The agreement also abolished the current coal tax for the remaining coal fired plants (by January 1, 2016). Note that the decision processes about the closing of the plant in the Energy Agreement and the discussions around the social plan, will not be further discussed as they lie outside of the study's scope.

More opportunities due to the Environment and Planning Act

After the decision was made to close the CG13, the national government invited Engie and the municipality of Nijmegen to discuss the next steps (Interviewee 9, personal communication, May 8, 2019). The national government granted the Engie site a special status for spatial planning (as part of the 'Crisis and Recovery Act' (Crisis- en Herstelwet) (Government of the Netherlands, 2019), which allowed Engie

to have shorter procedures in permit applications and to have more flexibility in their local zoning plan (Interviewee 12, personal communication, May 24, 2019). Later, this status was changed into a pilot for the Environment and Planning Act (Omgevingswet).[3]

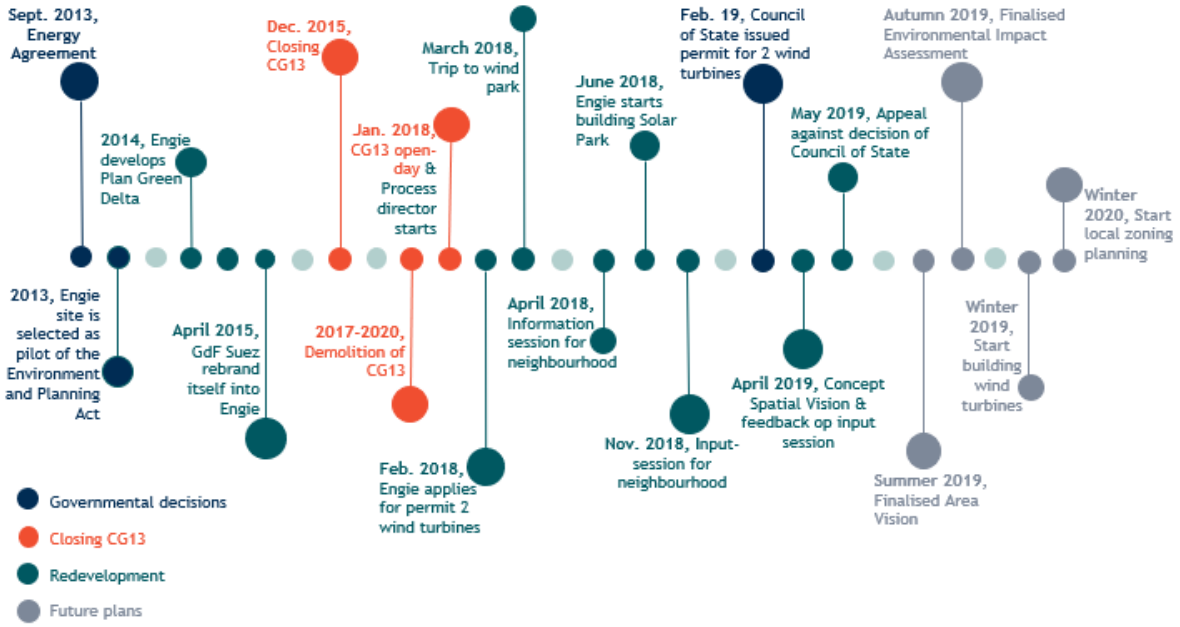

Figure 4-4. Timeline of the Engie case

Potential of the location

Another important factor in the Engie case is the location of the Engie site. After the Energy Agreement, Engie started to plan the closing. However, they realised soon that the site of the CG13 was very well located; close to the city and connected to the Waal river (see Image 5). Additionally, the energy distribution network was already in place. This all made the location ideal to generate decentralised energy while serving the city, the industrial area and the shipping sector in their energy demand. Moreover, on the site, there would be room left for other activities in relation to clean energy. To this end, Engie developed the 'Green Delta Plan' in 2014. They express their ambition in a YouTube video where they presented their ideas for:

Image 3. The Green Delta Plan. Source: Engie, 2016.

- 4000 (1 MW) solar panels and 2 to 4 wind turbines (10 MW);
- an LNG gas station for trucks and inland shipping sector;
- a biomass plant of which the generated heat would serve the heat distribution network (Engie Energie Nederland, 2016, November 26).

[3] Through the Environment and Planning Act (Omgevingswet) the government wants to combine and simplify the regulations for spatial projects. The aim is to make it easier to start up projects. For example, the construction of housing on former business parks, or the building of wind farms (Government of the Netherlands, 2019).

From GdF Suez to Engie

In 2015, GdF Suez announced to accelerate its strategic shift towards a low-carbon system which includes among others; the closure the Gelderland plant in the Netherlands. They also intend to make a substantial contribution to the energy transition by generating clean energy themselves but also by helping other organisation to achieve more sustainable practices (Engie, 2015). To underline their strategy, they changed their name into Engie. This change in strategy allowed Engie Nederland to explore the location opportunities and to start with the redevelopment.

Province's and municipality's ambition to contribute to the energy transition

The province has the objective to be climate neutral in 2050 (Gelders Energieakkoord, 2016). To meet this target, the Gelders Energy Agreement (Gelders Energieakkoord) was established in 2015 which is currently signed by 200 partners (Gelders Energieakkoord, 2019). Furthermore, the National Energy Agreement of 2013 stipulates the installation of 230,5 MW in the province by 2020. However, in 2014, only 36 MW wind power capacity was installed with another 34 MW capacity in construction (Gelders Energieakkoord, 2016).

The city of Nijmegen sets its climate targets more ambitiously by aiming to be climate neutral in 2045. The target is part of the sustainability program where they focus on the themes 'Climate and Energy', 'Noise, Air and Soil',' 'Green, Nature and the Living Environment' and lastly, 'Environmental Management'. As the former nota ended in 2017, they are developing their road map for 2019 and onwards. Meanwhile, they work on five themes of which 'sustainable economy' is one theme which the redevelopment of the Engie site is mentioned (Gemeente Nijmegen, 2011).

4.2.3 *(Inter)national policies*

In this sub-section, several policies that illustrate the institutional and energy related context of the Netherlands and Nijmegen are discussed. These policies are complemented with policies that promote energy justice and will be used in the evaluation of the case.

European union: regional development and energy policies

Under the RED I, the Netherlands also established National Renewable Action Plans (NREAPs) and sets its overall target for 2020 at 14.5% of share of energy generated from renewable sources in gross final energy consumption (Rijksoverheid, n.d.). In order to achieve the target, the Netherlands established a comprehensive legal and administrative framework nurturing deployment of renewables with a number of complementary financial, fiscal and promotional measures of which the Feed-in premium, called the SDE (stands for Stimulation of Sustainable Energy Production) (IEA, 2010b). However, as illustrated in Figure 4-5, the Netherlands is lagging in its renewable energy production, ranked third lowest of all the MS. Large energy sources are natural gas, oil, and coal (Rijksoverheid, n.d.).

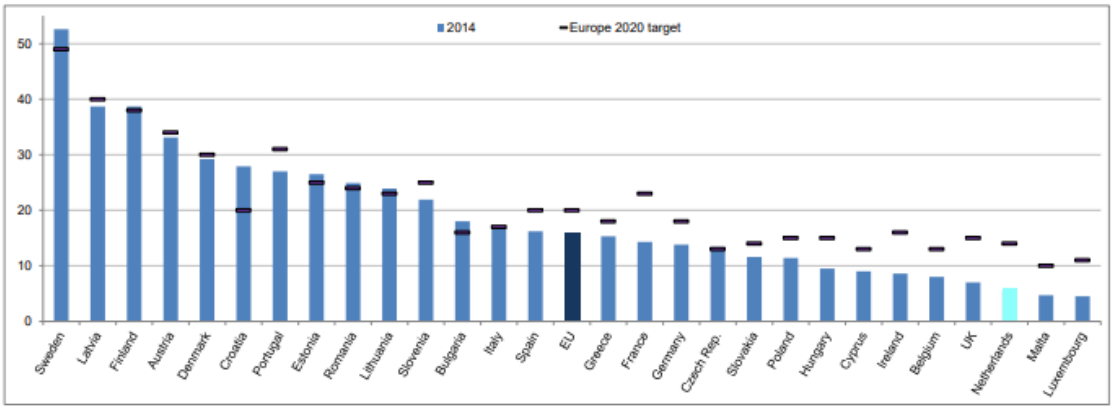

Figure 4-5. : Share of energy from renewable sources in the EU Member States, 2014 (in % of gross final energy consumption). The black bar represents each countries NREAP's target. Source: Eurostat, 2016.

Regional policies

In Section 4.2.2. the climate targets of the Province and the City of Nijmegen are discussed. Moreover, Nijmegen also developed a 'Heat vision of Nijmegen'. In this vision, the avoidance of energy poverty is mentioned as one of Nijmegen's main objectives. The municipality addresses energy poverty by ambitious performance agreements with housing associations about energy savings and energy efficiency measures in social housing. In 2016, Nijmegen won the price for the best agreement with housing associations for energy savings and energy efficiency targets, namely all houses need to have an energy label B by 202 (GNMF, 2016).

4.2.4 *Stakeholders analysis*

As described above, the two phases of the Engie case are characterized with different stakeholders who have different roles. The national government was important as they, together with the members of SER, decided to close the CG13. The national government was also involved in the negotiations around the social plan. In addition, the national government granted the Engie site the special status which provided Engie with the needed flexibility in spatial planning to start with the redevelopment.

In the diagram below, the central role of **Engie** is illustrated. The company has a leading role in both the closure and the redevelopment as they own the coal fired plant and the ground.

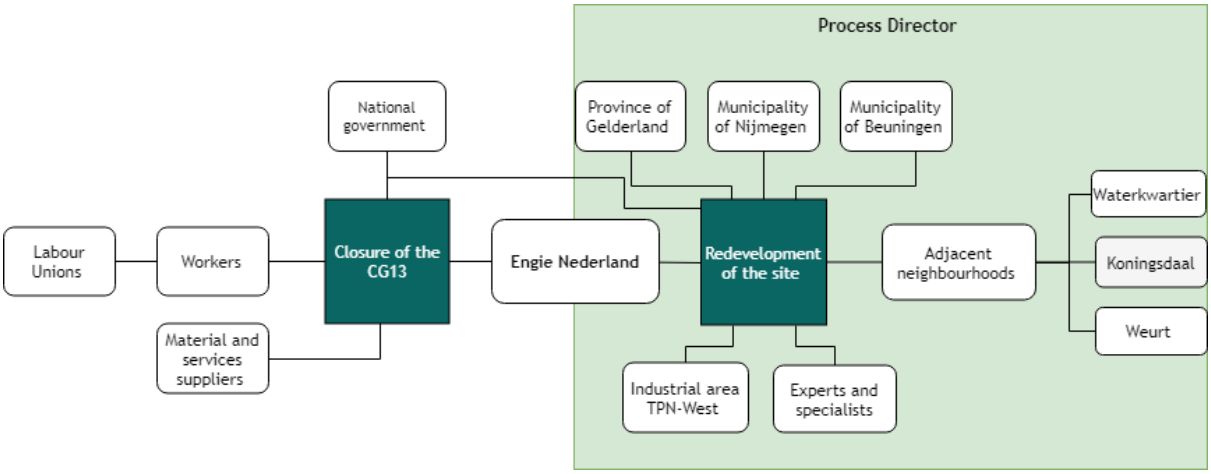

Figure 4-6. Diagram of the most important stakeholders.

With the closure of CG13, the **workers** were pivotal as they were directly affected by the shut-down by losing their source of income. The **labour union** protected the workers' rights by representing the workers in negotiations around the social plan.

In the redevelopment, the **Municipality of Nijmegen** is an important stakeholder as they are the appropriate authority and therefore approves Engie's Spatial Vision. The municipality sets appropriate regulations based on their knowledge of the local situation. Moreover, the municipality closely collaborates with Engie to find the best suited opportunities for the redevelopment of the site so that it benefits the city and limits the negative impacts on the surrounding neighbourhoods.
The **Municipality of Beuningen** is as a neighbouring municipality directly involved to defend the interests of its residents (neighbourhood of Weurt) and to seize opportunities.

The **Province of Gelderland** grants the permits for the new constructions such as the windmills and solar park. Moreover, the province is closely involved with the Engie project as they want to learn from the pilot with the Environment and Planning Act. Further, the proposed plans fit within their wind energy vision and will help the province to meet their sustainability targets (Interviewee 8, personal communication, June 5, 2019). They also supervise the Regional Program Work locations (RPW), to balance the amount of office places in Nijmegen (Interviewee 8, personal communication, June 5, 2019).

The surrounding neighbourhoods (**Waterkwatier, Koningsdaal** and **Weurt**) are important stakeholders as they may experience negative externalities from for instance wind turbines. The Environment and Planning Act also requires Engie to involve the residents in the decision-making process (Interviewee 9, personal communication, May 8, 2019). Moreover, the residents have the right to request an appeal to the province against the permits of for instance the windmills.

The Engie site is also part of the **industrial park TPN-West**, which is governed by the industry association TPN-West (TPN West, 2019). As the companies are the neighbouring companies of the Engie site, they can be positively or negatively affected by the new plans of Engie. An example is the container terminal BCTN, which is currently renting a part of Engie's land for storage.
Involved in the redevelopment are also specialists from different institutions, such as **spatial planners, environmental experts and project developers.**

Lastly, since January 2018, a **process director,** from consultancy company Over Morgen, was installed. This director is in charge of streamlining participation process in the redevelopment of the site. This includes building an efficient and effective organisation structure which incorporates all important stakeholders.

5. Results

The two cases are assessed by the application of the evaluation framework, developed in section two. For each case, results for the distributive, recognition-based and procedural dimensions of energy justice are discussed and summarised. In doing so, sub-question three is addressed: 'How and to what extent have the different justice dimensions been present in the case studies?'. Subsequently, the cases are

scored on their performance within the different dimensions of justice, to answer sub-question four. Additionally, several other indicators that are not yet included in the framework, but are mentioned in the interviews, will be added to evaluation framework. The added indicators are discussed at the end of each dimension. The results section ends by presenting the revised evaluation framework, addressed in sub-question five.

5.1 Results for case Burgenland, Austria

5.1.1 *Distributive justice*

Employment impacts

Increase in quantitative and qualitative employment impacts

The interviewees all indicate that the energy transition has brought an increase in both direct and indirect jobs. The manager director of Püspök Group explained how his company grew from 2.5 fulltime positions to 20 from 1995 to 2018. Also, Enercon, a wind turbine producer, located a plant in Burgenland which created 200 jobs in their most productive years. Aside of technical jobs for engineers and mechanicals, the employment grew in the service sector such as restaurants and hotels, but also in research, education and agriculture sector jobs (Interviewee 2, Personal Communication, May 2, 2019). As the transition attracted more people to Burgenland, there was higher demand for workers in supermarkets, shops, kindergartens etc. Moreover, the clean energy transition did not eliminate any jobs in Burgenland because the non-renewable energy consumed before was imported to Burgenland.

Overall, it is estimated by the interviewees that from 1995 to 2013 the jobs increased by around 30%, for a total of 3000-6000 jobs (Interviewee 2, Personal Communication, May 2, 2019). According to the director of Burgenland Energy Agency (BEA), this is the highest growth in jobs of all the objective 1 areas, together with an area in Poland.

Comparing these numbers with the data from the OECD (2019), the unemployment rate for labour force over 15-64 years in Burgenland was 5% in 2001[4] which reduced to 4.3% in 2013. For Austria, the rate was about 4% in 2001, and grew to 5.4% in 2013. Comparing the trend in Burgenland with the trend in Austria it seems that the energy transition had a positive impact on employment.

Taking a closer look at gender equality in employment, several interviewees emphasised that the renewable energy industry is a male dominated industry. However, some interviewees stated that there were several women working as technicians, however, most of interviewees were not aware of the issue. There is attention for gender equality in education programs at the university of applied sciences in Burgenland. To avoid women being discouraged by the word ‘technology’ the university named the study program ‘Environment and Energy management’ instead of ‘Environment and Energy technology’.

The gender statistics reveal that the difference between the unemployment rates of men and women of working age is 0.9% in 2001 and 0.6% in 2013, which is the same as the national statistics (OECD, 2019). This implies that overall, the difference is very small and has declined over the years.

[4] From 2001 data is available for both national and NUTS 2 level.

Statistical data shows that overall the levels of education increased with the labour force of Burgenland. From 2001 to 2013, the labour force with only elementary education levels lowered by 9.2 points, which is almost twice the national reduction. Thus, overall education levels of labour force increased.

Income impacts

Regional income increases

From 2001 to 2013, the regional GDP per capita[5] increased in Burgenland by 46.3%. Over the same time period the national GDP increased 37.8% (OECD, 2019). However, in 2013, the regional GDP in Burgenland accounted for 2.3% of the Austrian GDP (OECD, 2019). As such, the province grew from a low-income region to a middle-income region (Interviewee 2, Personal Communication, May 2, 2019). The increase of income per capita contributed to that, however, this increase cannot solely be contributed to the renewable energy sector as there were also many developments in other sectors such as tourism and agriculture. Lastly, as there were more people with higher income, more tax money was collected, which increased the income for the municipalities and province (Interviewee 1, personal communication, May 13, 2019).

Municipalities within the regional zoning areas especially benefited

Due to the regional wind energy zoning plan, the income impacts for the municipalities in Burgenland differ per municipality. Per wind turbines, the municipality receives annually a certain amount from the wind energy developer. The manager director of Püspök Group, states:

"Municipalities are our partners as they provide public roads for cables and transport. The impact the windmills have on the landscape is an issue according to some people. So, when municipalities provide us with land, permit, road, etc., we have to pay to them. This include also the compensation for being negatively affected due to landscape changes."

As side of the revenues from the wind operators, the municipality also experience a boost in the local economy as the construction phase brings in additional employment and expenditures.
However, as not all municipalities are within these wind energy zoning areas, not all municipalities enjoy these benefits.

Higher personal- and labour income

Landowners receive a financial compensation (rent) from the wind operators for having a wind turbine or swept area of rotor blades in their fields. Wind operators pay in conformity with the market. According to the manager director of Püspök group, the landowners are compensated very well. In 2001, the prices were low as people were not well informed and the market was less developed. In 2014, prices have almost doubled due to market developments, better informed landowners and the scarcity of available places.

Energie Burgenland enabled financial participation by selling shares of a few wind turbines to the general public. By becoming a shareholder, personal income increases as it receives dividend. However, this was

[5] Purchasing power parities (PPPs) in USD.

only one event and the shares were sold out in one day (Interviewee 2, Personal Communication, May 2, 2019).

Overall, labour income increased as more people have highly qualified jobs with high wages. Statistical analysis shows that households' disposable income (income after taxes and benefits) increased from 2001 to 2013 by 8.4% more than the national growth rate which made that in 2013 the Burgenland's households' disposable income was slightly higher than the national average (OECD, 2019).

Income inequality likely to decrease

While income inequality was important for the interviewees, they were not familiar with the development of this indicators in Burgenland. However, based on statistical analysis it is expected that the Gini coefficient[6] in Burgenland decreased significantly from 2001 to 2013. Although the Gini coefficient was only calculated on region level for the year 2013, an indirect indicator for income inequality is the share of people under the poverty threshold.[7] In 2005,[8] Burgenland's poverty rate after taxes was 15.2% (nationally this share was 12.3%), which decreased in 2013 to 7.1% (nationally this share was twice as much in 2013) (Statistics Austria, 2013). Furthermore, in 2013, Burgenland ranked third lowest of all OECD regions, with a Gini of 0.23 whereas the national Gini coefficient was 0.28 (OECD, 2019). It is therefore likely that this steep decrease of share of people in poverty, together with a very low Gini coefficient in 2013, indicates that the overall income inequality in Burgenland has dropped from 1995 to 2013.

Impacts on the local economy: more diversified, growth in the energy and tourism sector

Traditionally, the economy was predominantly agriculture based including fruits, root vegetables and vine crops. In 2013, the economy significantly diversified by the growing renewable energy and tourism sector, both boosted by the Objective 1 funding (EC, 2019). Comparing the regional gross added value of different sectors between 2004[9] and 2013, confirms that many sectors have increased in added value, while the agriculture sector reduced (OECD, 2019). Among them are manufacturing sectors, tourist sector, the industry sector including energy and scientific and technology sector (OECD, 2019).

Boost in innovation, technology development and education

Around 2015, six technological centres were established to boost energy technology development and other innovation. Already in 1994, the University of applied sciences was established. At the university a lot of research is done on e.g. advanced research in energy and construction technologies such as improving efficiency in heat pumps, and converting hydrogen power into gas (Interviewee 2, Personal Communication, May 2, 2019). In total the university took part in over 170 projects for a total amount of over 7 million euro (Energy Cities, n.d.). Statistical data confirms that innovation has increased over the years as 25% of the increase of personnel in regional industry was in the sector of science, education and technology. More specifically, the regional R&D personnel grew with a factor of 1.5 between 2002 and 2013. However, nationally, Burgenland scores the lowest of all nine states (OECD, 2013).

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6 The Gini coefficient has a range from zero (when everybody has identical incomes) to 1 (when all income goes to only one person).
7 The poverty line is defined as 60% of median income.
8 First year with available data
9 Earliest data available

In relation to education impacts, the university developed a study program focusing on renewable energy. About the educational impacts, the director of BEA argues:

"The university has a bachelor and master in renewable energy technology, building technology and so on. So, the impact on education level, we can say, is a big impact; the university started with 0 students and now has around 1000 students. And if you have a lot of students, like 50% will stick around, so it has positive impact."

However, looking at the trend of student enrolment at elementary and secondary level rate, it shows no increase and even a slight decrease between 2002 and 2013 (OECD, 2019).

Energy impacts

More decentralised energy production

Interviewees indicate that due to national renewable energy subsidies (up to 5 kWh) and high number of private-owned houses, many households installed solar PVs and heat pumps. Moreover, due to technology development the prices of solar PVs reduced over the years. Burgenland's data shows that in 2011[10] 38.5% of its energy consumption was generated from renewable energy sources (compared to the 3% in 2000) (Burgenland, 2013). This trend has only increased towards 2013. Moreover, non-renewable sources in final consumption are reducing significantly, except for oil consumption. Especially coal final consumption went down from 793 TJ in 1995 to 76 TJ in 2013 (Land Burgenland, 2013). Moreover, since 2013, all of Burgenland's energy production is 100% renewable (Burgenland, 2013).

Positive impact on affordability of energy

The electricity prices in Austria has always been stable and low (in comparison with Germany) (Interviewee 6, personal communication, May 22, 2019). National statistics shows that energy prices for oil and gas have barely risen and electricity has even fallen (BMNT, 2018). Only the district network heating costs 10% more than normal heating by natural gas. In addition, renewable energy sources dampen energy prices during peaks of energy consumption. Managing director of Püspök group, explains how the prices are influenced:

"Before there was the situation in Austria where there was very large difference between energy prices (peak hours in the morning and evening and spring versus other seasons). This is partly because the hydro pumps, who are partly state-owned, would switch on when there was not enough electricity, which increased the electricity prices. Due to the increase of renewable energy resources there is now less reliance on the expensive hydro pumps for the balancing of electricity on the grid and this reduces the energy prices during peaks."

Information on the performance of the indicator energy poverty was not available for the regional level.

Increased security of energy supply

Renewable energy production also increased the security in energy supply two ways. Firstly, for the distribution of renewable energy sources, the grid needs often be improved to deal with the peaks in

[10] No aggregated data for the year 2013.

energy production. This upgrade to the grid increases the quality of the energy distribution network, which enhances the security of energy supply. Secondly, the combination of different energy sources (wind, solar, biomass and hydro energy) increases the security of energy supply as there is less dependency on one source of energy as well as on energy imports. However, it must be noted that renewable energy will always remain volatile as it depends on natural circumstances, such as wind and sun to generate electricity. Nationally, security of energy supply has increased as e.g. energy import dependency has fallen significantly from 2005- 2017 from 71.8% to 64.2% (BMNT, 2018).

Demographic and tourism impacts

Limited impact on migration

The economic development of the region attracted a few thousand people, especially in the main cities (Interviewee 6, personal communication, May 22, 2019). However, the Burgenland statistics show that the number of migrants and the inter-regional migration has barely increased and that the population remained stable between 2001 and 2013 (Land Burgenland, 2019).

Energy transition contributes to increased tourism

Interviewees indicate that the tourism sector flourished under the renewable energy transition. The tourist office organised bike tours to visit the windmill park (Interviewee 3, personal communication, May 7, 2019). From 1994 until 2014, the overnight stays in hotels and guesthouses increased by 39% (IG Windkraft, 2015). In this period 12 new hotels were built (Interviewee 2, Personal Communication, May 2, 2019). In the figure below, the simultaneous growth in overnight stays and wind energy is illustrated. However, interviewees indicate that the increase in tourism is not solely attributed to the expansion of wind energy. The increase is the result of combination in nature conservation and upgraded thermal pools and tourist accessible vineyards.

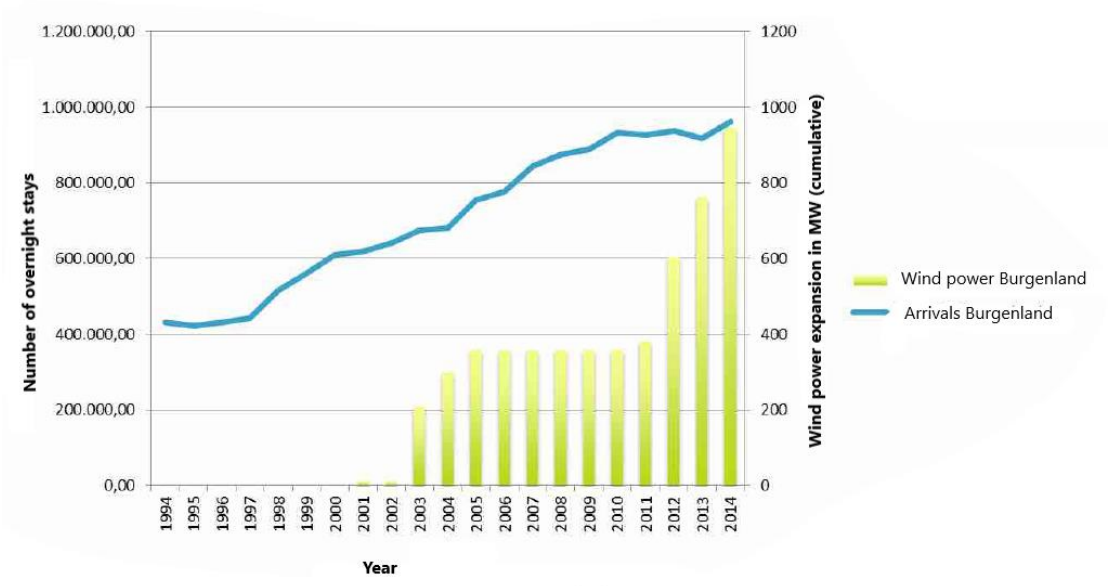

Figure 5-1. Overnight stays versus wind energy. Source: IG Windkraft, 2005.

Social cohesion: energy transition brought the community closer together and made people proud

Many interviewees indicated that the people of Burgenland were in line with the political decision to reach 100% self-sufficiency in renewable electricity by 2013. The commitment to wind energy has grown

in the public as its advantages are better understood and because they are getting used to the sight of wind turbines (Interviewee 4, personal communication, June 3, 2019). The fact that people support the political will for the transition, increases the social cohesion in Burgenland.
Interviewees argues that the people are keen on having green electricity and being self-sufficient in their electricity demand (Interviewee 7, personal communication, May 3, 2019). Director of Burgenland Energy Agency illustrates how the energy transition has changed people's mind-set:

"People are proud when they use less energy than before. They try to renovate houses and to have efficient machines. Nowadays it is not done to have for instance a fossil fuel-based generator for the heating of your house."

Moreover, social cohesion grew as the regional and local zoning plan brought stakeholders, who would normally not have cooperated so intensively, together.

Additions to the evaluation framework

In many interviews the **environmental impacts**, such as **landscape changes**, but also impacts on **biodiversity** and **CO_2 emissions** were found important. Especially, biodiversity conservation was essential for many stakeholders. For this reason, the key variable of environmental impacts is added to the framework. Below the results are discussed.

Environmental impacts

No harmful impact on biodiversity

The installation of the wind turbines did not result in any biodiversity losses. In the regional zoning process, there were many environmental NGOs and experts involved to ensure that wind turbines would not be erected in bird nesting areas and bird migration routes. Also, bats and reptiles were taken in account. During the energy transition, several studies were conducted to examine the impact of the wind parks on Burgenland's biodiversity. In some occasions, dead birds were found, however, overall the biodiversity blossomed as more attention was given to nature conservation during the energy transition. Moreover, the Großtrappe's population, one of the heaviest birds in the world and endangered in Europe, grew from 150 to 500 birds (Interviewee 2, Personal Communication, May 2, 2019). Since 2011, 30 endangered bird species are counted each year, and the overall trend for many species is an increase in the population number (Land Burgenland, 2019). The director of Burgenland Energy Agency remarks on the biodiversity success:

Image 4. Großstrappe. Source: Wikipedia, 2019.

"Besides all the areas for the windmills we also made green areas. Before the energy transition we had mass production in agriculture. Therefore, there were almost no living and nesting possibilities for the birds. The agriculture sector used also lot of harmful pesticides. With the energy transition, additional trees and protected zones were established. So, there is more flora and fauna then we had before. It is a win-win situation; on the one hand a lot of production of electricity and on the other hand more protected area for flora and fauna as we had before."

Wind turbines changes landscape image of northern Burgenland and produces nuisance

As the land in Burgenland is mostly flat, many interviewees point out that everywhere you look in the North, you will see windmills (see Image 6). Moreover, some people close to the wind parks experience hindrance from the infrasound or shades of the rotating blades. However, to protect residents against this nuisance, there are strict regulations stipulating for instance the distance between a house and the wind turbines.

Large reduction in CO_2 emission impact

In 2013, the total GHG emissions by all sectors[11] was 1.746.000 tonne CO_2 equivalent, which was almost around the same level as in the year 1995. Between 2003 and 2005, Burgenland showed a peak in GHG emissions (~2.090.000 tonne CO_2 equivalent). The large decline in GHG emission in 2013 was mostly due to the large reduction from the energy sector (from 70.000 in 2003 to 6.000 tonne CO_2 equivalent in 2013) and the construction sector (from 526.000 in 2003 to 258.000 tonne CO_2 equivalent in 2013) (Land Burgenland, 2019).

Image 5. The Parndorfer Platte (northern Burgenland). Source: ÖIR, 2013.

Burgenland's score on distributional dimension of justice.

The next step is to score the cases on their performance on energy justice. To this end, the different indicators under the three dimensions can score, positive, neutral, negative or blanco.
Based on this scoring mechanism it can be concluded that Burgenland scores mostly positive on the distributive dimension of justice (see Table 5-1). Out of the 23 indicators, 17 indicators were scored positive, 5 indicators have a neutral score and for one indicator there was not enough information available to score.

The case of Burgenland shows that the energy transition helped the region to boost its economy and at the same time reduce poverty rates in the region. It is therefore likely that the energy transition resulted in inclusive growth, reducing income inequality. Other social impacts are the reduced unemployment rate and the increased education levels of the working force. Additionally, the energy transition did not increase energy prices, nor did it jeopardise the security of energy supply. Moreover, the people of Burgenland are proud about their green electricity production and show more awareness about climate change.

One of the four neutral scores is for the impact on 'Job opportunity for people with lower levels of education attained' as is seems that most of the new employment required higher education and skills

[11] Sectors included are: Energy, industry, traffic, construction, agriculture and other.

levels. Moreover, ‘Income impacts for the municipality’ is scored neutral as for now only the municipalities within the selected wind energy zones are able to receive wind energy revenues, which means that the benefits are not fairly distributed. ‘Migration impacts’ scored neutral as there is only a slight increase in the number of immigrants and inter-regional migration to the region. Lastly, both landscape impacts and environmental nuisance impacts are scored neutral as it is known that the erection of wind turbines had an impact on these indicators, however, interviewees were not clear in whether these impacts are perceived as positive or negative.

Table 5-1. Burgenland: Overview of the results and scoring for distributive justice.

Key variable	Indicator	Sub-indicator	Data source	Burgenland assessment	Scoring
Quantitative employment impacts	Changes in employment	The number of created or terminated jobs/ changes in employment rate	Interview data	3000-6000 new jobs of which (direct) green jobs (technical jobs) and (indirect) jobs (service sector & research & technology sector).	
			OECD data	From 2001 to 2013 unemployment rate reduced by 0.7%.	
Qualitative employment impacts	Gender equality: job opportunity and job security	The number of new jobs that are allocated to women versus men	Interview data:	The renewable energy industry is mostly a male dominated industry. However, there is attention for gender equality in education programmes.	
			OEDC data	From 2001 to 2013, there is almost no difference between unemployment rate between men and women.	
	Skill- and education level: job opportunity and job security	The number of new positions that are suited for low educated versus high educated	Interview data	Mostly high-skilled and high-education jobs, some indirect jobs (hospitality and tourism sector) are suited for lower levels of education attained.	
			OECD data	From 2001 to 2013, 25% of the new created jobs were in the scientific and technology sector and 45% of destructed jobs were in the agriculture and forestry sector. 9% of the lower educated workers acquired a higher level of education.	
Income impacts	Income impacts for the region	Changes in GDP for the region	Interview data	From low to middle income region and more revenues because of increase in taxes	
			OECD data	Regional GDP per capita grew from 2001 to 2013 by 46.3%	
	Income impacts for the municipality	Changes in income for the municipality	Interview data	Municipalities within the wind zoning areas receive a few millions from the wind energy operator for each erected wind turbines.	
			Statistical data	No information found	
	Labour income impacts	Changes in labour income	Interview data	Higher wages because of higher skilled jobs. Jobs in other energy related sectors are barely jeopardised.	
			Statistical data	No information found	
	Personal income impacts	Changes in personal income	Interview data	(Limited) option available to became shareholder of a windmill. Landowners receive rent from energy company as compensation.	
			OECD data	From 2001 to 2013, the households' disposable income in Burgenland grew by 56.5% and was around 2013 slightly higher than national average.	
	Income inequality	Changes in income inequality (as indicated by the Gini coefficient)	Interview data	No information available.	
			National & OECD data	From 2005 to 2013, the share of people in poverty has dropped by 8% and is twice as low as the national average in 2013. Moreover, in 2013 Burgenland had the third lowest Gini coefficient (0.23) of all OECD regions).	
Economic diversification	Impact on local economy	Changes in the economics sectors of the region	Interview data	Renewable energy and tourist sector grow which diversify the economy.	
			OECD and EC data	More diversified economy as illustrated results in an increase of added value for several economic sectors from 2004 to 2013.	
	Dependency on one/energy sector	Changes in dependency on one income source for the region	Interview data	Dependency on the agriculture sector is reduced as the local economy is more diversified.	
			OECD and EC data	Reduced added value in the agriculture sector	

Innovation and education impacts	Impacts on technology development	Changes in technology development	Interview data	Boost in research and innovation with the establishment of 6 research centres and the university	
			OECD data	Almost 150% increase in personnel in the R&D sector from 2002 to 2013.	
	Impacts on education system	Changes in education system	Interview data	University with 1000 students and program on renewable energy topics.	
			OECD data	Trend shows a slightly decrease in student enrolment.	
Energy related impacts	Impact on decentralised energy production	Changes in households' self-sufficiency in energy/ changes in decentral energy production	Interview data	More houses with PVs and heat pumps due to private-owned houses, subsidies and reduced prices for PVs More awareness about energy consumption.	
			National data	In 2011, 38.5% of energy consumption was generated from renewable energy sources (compared to the 3% in 2000).	
	Impact on affordability	Changes in energy prices for consumers	Interview data	Stable energy prices.	
			National data	Energy prices for oil and gas have barely risen and electricity has even fallen.	
		Changes in energy poverty rate	Interview data	No information available.	
			Statistical data	No information available on NUTS2 level.	
	Impact on energy supply security	Changes in energy supply security e.g. reduced import dependency	Interview data	Renewable energy increased energy supply by 1) improved grid, 2) less dependency on one energy source and 3) less dependency on imported energy.	
			National data	Energy import dependency has fallen significantly from 2005- 2017 from 71.8% to 64.2%.	
Demographic impacts	Migration impacts	Changes in the number of people moving in or out of the region	Interview data	Limited impact.	
			Burgenland statistics	Limited impact	
	Tourist impacts	Changes in the number of tourists	Interview data	Increase in tourism, however not only wind energy tourists but also wine-, thermal- and nature tourists.	
			IG Windkraft	From 1994 to\ 2014, the overnight stays in hotels and guesthouses increased with 39%.	
Social cohesion impact	Impacts on collective feeling	The community experience changes social cohesion	Interview data	The zoning process brought many stakeholders together. People are proud that they are self-sufficient in their electricity production.	
			Statistical data	No information available.	
Environmental impacts	Biodiversity impacts	Changes in variety of species and numbers	Interview data	No biodiversity losses and even improved numbers of endangered bird species.	
			Statistics Burgenland	Number of birds per species increases.	
	Land-change impacts	The aesthetics/image of the landscape changes	Interview data	Impact on landscape image as the windmills are highly visible at the flat landscape.	
			Statistical data	No information found.	
	Environmental nuisance	Increased/decreases noise, smell and pollutants levels	Interview data	Hinder from wind parks: noise and shade from the rotating blades.	
			Statistical data	No information found	
	CO_2 emissions impacts	Reduced CO_2 emission in energy consumption	Interview data	No information found.	
			Statistics Burgenland	The GHG emissions are around the same levels in 2013 as in 1995.	

5.1.2 *Recognition justice*

Recognition of vulnerable groups is better at national level

At federal state level, attention is given to vulnerable groups such as youth, elderly, people with distance to the working place and low-income households in relation with the energy transition. The risk of energy poverty for lower deciles and elderly is barely discussed. At the national level, there is more awareness of energy poverty. Households in energy poverty are households who are below established poverty risk threshold and with above-average energy costs (E-Control, 2013). Moreover, at national level there is a strong welfare system in place that protects vulnerable groups. The former governor elaborates:

"The green electricity surcharge is kept as low as possible so that low-income households can still afford to pay their electricity bills and since 2012 low-income households are exempted. Additionally, there is a lot of social support in Austria for low-income households. In Austria, we have minimum income, heat subsidy, and other social assistance. There are thus already many ways for lower income households to receive additional financial means."

Governments and energy companies value other (local) opinions

The arguments against changes to the energy system are heard in Burgenland. Furthermore, locals and environmentalist groups indicated that they feel treated respectfully. Especially given that within the regional and local zoning planning process, ideas and arguments from environmental NGOs and citizens are included. It was one of the main objectives of the energy transition to have no local initiatives against wind energy (Interviewee 5, personal communication, May 16, 2019). Therefore, the planning approach aimed to minimise negative (landscape) impacts for the residents and the biodiversity of Burgenland. If there were concerns, changes were made. Therefore, there is no anti-wind organization or protests in Burgenland (Interviewee 4, personal communication, June 03, 2019).

The local zoning planning requires wind energy developers to inform and convince the local residents about the installation of wind turbines in their neighbourhood. If the majority in a municipality does not agree, the permit to the wind energy developer is not granted. Moreover, the wind energy developer needs the permission of a landowner. Throughout the years, the energy companies have been very skilled in this process of engaging and informing people. Interviewee 6 from Püspök Groups tell about his experience:

"You can never convince everyone of wind energy. Some say it's ugly, not economic, etc. There are many arguments against, but we have counterarguments for all of them. However, you can never change everyone's opinion. If somebody comes and says: "I don't want it". I will not try and change his mind. The advantage of wind power is that you do not need much space to install them, you can change the position easily. So, if someone does not provide their land then it is the neighbour."

The above quote illustrates that wind energy developers respect the opinions from locals but at the same time they neglect the opinions of a landowner if he/she does not agree with the erection of a wind turbine as the developer will then built on neighbouring land.

Additions to the evaluation framework

In the interviews, policymakers expressed their worries for the security of energy supply for future generations. Moreover, many interviewees mention the importance of safeguarding the biodiversity of Burgenland. Therefore, the **recognition of needs of future generations** and the **recognition of the needs of nature** are added to the evaluation framework.

Recognition of future generations and nature: we should not impose our problems on the next generations nor on nature

Future generations were considered by the policymakers among the interviewees. Especially the former governor remarks on the importance of future generations:

"We need to consider future generations. Nuclear plants are still running, and they might have low CO_2 emissions, but they are very polluting and harmful for the next generations. In our view, renewable energy is a significant contribution to climate protection and therefore safeguarding the future for the future generations. My next point is that fossil fuels are limited; the reserves for oil and gas will end in a few decades. Therefore, for the next generations, we have to think how we can secure the energy supply. For us, that is done by developing renewable energies"

In addition, biodiversity is one of the priorities on the agenda of Burgenland. Moreover, climate change moves politicians to accelerate the energy transition.

Scoring for recognition justice

For the scoring of recognition justice, the same scoring mechanism is applied. However, as the indicators do not concern any impacts, the indicators can be score high, medium, low or blanco respectively, instead of positive, neutral or negative.

On recognition justice the case of Burgenland scores high (see Table 5-2); five out of seven indicators score high, and only one indicator scores medium, and one in marked blanco. This is because policy makers in Burgenland recognises that not only the current generation should have security of energy supply, but they also take in account the (energy) needs of future generations. In addition, policy makers recognised the need to safeguard the flora and fauna of Burgenland. To this end, Burgenland shows best practices in recognising the needs of normally misrecognised groups. Overall, the policy makers in this case recognise that some groups in society need more attention during the energy transition. Furthermore, during open discussions there is room for different voices which makes that people feel heard and treated respectfully. Only on 'Recognition of energy poverty', Burgenland scores medium as this indicator was not really known under the policy makers interviewed.

Table 5-2. Burgenland: Overview of the results and scoring for recognition justice.

Key variable	Indicator	Sub-indicator	Burgenland assessment	Scoring
Recognition of vulnerable groups	(Special) attention for vulnerable groups in energy transition	Recognition by policymakers that vulnerable groups in the energy transition should be included	On national level vulnerable people are taken into account e.g. no green electricity surcharges for low-income households.	
	(Special) attention for energy consumption of vulnerable groups	Recognition by policymakers that these groups might need more than the average energy consumption of households	Not discussed in the interviews.	
	(Special) attention for energy poverty	Recognition by policymakers that low income households are prone to or are in energy poverty	Yes, as there is a heat subsidy. Energy poverty is well recognized at national level, but less on regional level.	
Respectfully treated	Governments and energy companies value other (local) opinions	Ideas and arguments against the changes to the energy system are (un)heard	Yes, among others; objective of no civil engagement against wind energy.	
		Locals and environmental NGO's indicated that they feel treated (dis)respectfully	The regional and local zoning plan made that locals and environmental NGOs feel treated respectfully. Wind energy developers respect the ideas against wind energy but will try to convince people or to convince their neighbours.	
Recognition of the needs of future generations	(Special) attention for flora and fauna in policy making	Recognition by policymakers that action now, will jeopardize the opportunities of future generations	Policymakers indicate that this is an important topic for them.	
Recognition of the needs of nature	(Special) attention for flora and fauna in policy making	Recognition by policymakers that nature is important for safeguarding the earth and that the nature has right and needs as well.	Especially conservation of biodiversity is important.	

5.1.3 *Procedural justice*

All relevant stakeholders were included

There were four relevant decision-making processes identified in the Burgenland case. The first decision was the one to become 100% self-sufficient by 2013. This decision was not very inclusive as mainly the state's government, national government and some experts were involved.

The second decision-making process regarded the regional wind energy zoning plan which was very inclusive as all relevant stakeholders such as wind energy operators, NGOs, experts and municipalities were involved. However, citizens are occasionally involved. Mostly in information talks or as a result of special citizen initiatives (Interviewee 5, personal communication, May 16, 2019).

The third decision-making process was about local zoning planning in which the wind developer, municipality, citizens and landowners were involved. The last decision-making process was about the 2020 strategy. In the development of this strategy all relevant stakeholders were included.

Stakeholders participate in decision-making and are able to influence the outcomes

Being included does not directly translated into a just decision-making process. It is also important to see how this process looks like, how input of different stakeholders is treated and how stakeholders can alter the decision-making process.

Participation in decision-making process

As stakeholders were mainly involved in the regional- and local zoning plan and the development of the 2020 strategy, these processes will be discussed here in more detail.

Regional wind energy zoning plan

A spatial planner from the Austrian spatial planning institute explains the process of the successful regional zoning planning:

"First a collection of different experts meets to define the 'first framework' of possible places for the erection of wind turbines. These are experts in spatial planning and legislative issues, etc. and experts in birds/bats (biologists). Based on this framework, the moderated process starts involving additional stakeholders such as NGOs (i.e. BirdLife), environmental protection office of Burgenland, spatial planners, representatives of municipalities (i.e. mayor), the provincial environmental ombudsman, Neusiedl Nature Reserve, Vienna University of Technology and the wind energy developers. We call this process the round table where we discuss together and define the concrete zones; we look at where it can be built, distances between the wind park and settlements, how high it can be etc. Again, this is a moderated process, it is about mediation and participation. The outcome is 'an expert statement', a unanimous decision, which is proposed to a steering group enacted by law, consisting of politicians and representatives of spatial planner and interest groups who will make the final decision. However, this is mostly a formality as the expert statement is often directly adopted."

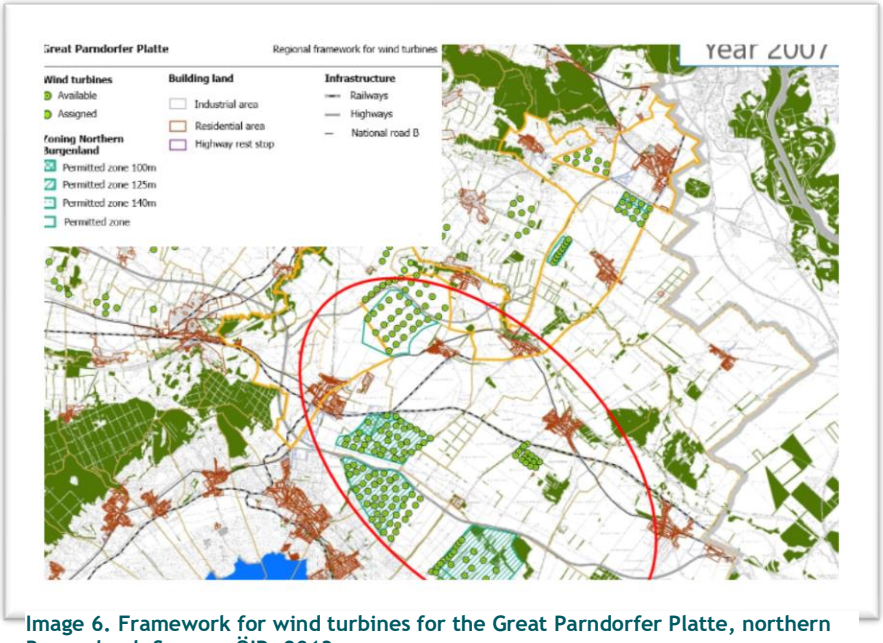

Image 6. Framework for wind turbines for the Great Parndorfer Platte, northern Burgenland. Source: ÖIR, 2013

Local zoning planning

The local zoning planning is a triangle of cooperation between municipality, wind developer and landowner. When a municipality is within the regional zoning area, it is very easy for the municipality to make the decision to join. However, the residents first need to agree before the wind turbines can be built. The spokesman from wind energy association Austria elaborates:

"Nowadays the municipality conducts a public survey to ask permission to the public. Before, this was done by asking the citizens one by one if they agreed. For every project, the wind developer has to work hard by providing information to the village, convince the people that this is a good project. For the project owners, this is a hard job, but they know how to do it. So, we have the discussions before and only after the discussions, the people in the region can decide. This procedure made that we had a 100% acceptance rate in Burgenland."

The 2020 strategy

The director of Burgenland Energy Agency explains how the citizens were involved with the development of the 2020 strategy:

"I remember very well, when we were writing the new energy and environment strategy, there was a public consultation process where each citizen could share his or her opinion via email. But also, directly, as there were some roadshows in the south and north, which was advertised in the magazines. The politicians organised the roadshows and people came to share their opinions about the future of energy and environmental policies."

Altered decision making in relation to biodiversity conservation

Based on the procedures describes above, it is clear that especially in the regional and local zoning plan, arguments against or in favour of the creation of wind energy could alter the decisions. Especially the argument of bird migrations routes, has changed a lot of zones into no-zones (Interviewee 1, personal communication, May 13, 2019).

Many efforts to inform and mobilise of knowledge

Many efforts have been made to inform the people of Burgenland about the energy transition. Some respondent stated that the informing already starts in kindergarten. Moreover, several information sessions were held during the last two decades, including 'girls events' to teach girls about the energy transition. Additionally, several campaigns were organised to inform citizens, children and elderly people about the benefits of renewables. Moreover, people could make use of several consultancy organisations who give insights on household' energy use and gave advice on e.g. energy savings (Interviewee 2, Personal Communication, May 2, 2019). There were also (governmental) websites, providing information about the pros and the cons of the energy transition.

As a result of these information efforts, the interviewees indicate that the people of Burgenland understand the topic. They base this conclusion on two observations.

1) People start using their electricity more economically when they produce their own electricity. They for instance learn that when the sun shines, it is not economic to plug-in their electric car and at the

same time put the washing machine on as their rooftop PV cannot generated enough electricity for both.

2) Moreover, residents close to wind parks show more awareness about the importance of combatting climate change which is assessed in surveys (Interviewee 3, personal communication, May 7, 2019).

Not all decision-making and budget allocation is transparent

The interviewees state that the yearly energy production reports, environmental impact reports, studies on biodiversity and the allocation of European funds are available for the general public and easily accessible. Moreover, interviewees state that the local zoning plan is very transparent. Overall, the interviewees point out that the region is too small to 'keep secrets' and every development or happening is announced on the radio, television and in the newspapers.

However, what is not transparent is how decisions are made at provincial level. The decision-making process for the regional zoning planning is getting more transparent but was first not available for the general public. Furthermore, the allocation for the municipal revenues receive from the wind energy operators, is not transparent. So, people do not have insights in where the benefits are invested in (Interviewee 6, personal communication, May 22, 2019).

Representation in institutions

Most of the interviewees are not aware of this topic and has been excluded for the Burgenland case.

Scoring for procedural justice

On this last dimension of justice, the case of Burgenland scores high on seven indicators and medium on one indicator, 'Availability of information' (see Table. 5-3). This is mostly due to lack of transparency on the budget allocation of the financial benefits from the wind parks. Additionally, transparency could be improved about the decision-making process of the regional wind energy zoning plan. However, the overall procedure of the energy transition has been very inclusive.

Table 5-3. Burgenland: Overview of the results and scoring for procedural justice.

Key variable	Indicator	Sub-indicator	Burgenland assessment	Scoring
Inclusiveness	Relevant stakeholders are involved	All relevant stakeholders were included in the decision-making process	Target-setting: Medium inclusive Regional zoning plan: Highly inclusive, but (almost) no citizens. Local zoning plan: highly inclusive 2020 strategy: highly inclusive	
Participation	Participation in decision-making process	Workshop and input sessions were organised where stakeholders could participate in decision making	Regional zoning plan is based on moderated process which results in unanimous decision Local zoning plan: is a cooperative process between municipality, wind developer and landowner. The majority of citizens need to agree via a survey 2020 strategy: public consultations process	
	Altered decision making	Ideas and arguments for changes to the energy system are included in the decision-making process	Yes, especially in the regional and local zoning planning	
Mobilisation of knowledge	Knowledge about the topic is provides	Informative websites and information sessions are offered to provide the	For citizens: many efforts (campaign, information events, consultancy and website).	

		general public with relevant knowledge		
		People indicate that they understand the topic	Yes, changes in behaviour when households produce their own electricity and people are more aware about climate change.	
Transparency	Availability of information	Information about important decisions, results of environmental impacts reports, financial reports etc., are publicly available	Overall transparent, except for the allocation of the municipal revenues received from the wind energy operator and decision-making for the regional zoning plan.	
	Easy accessibility of information	Information is easy to find and to access	Yes, on governmental websites.	
Representation in institutions	Equal representations of society	Decision-making bodies have an equal representation of society (e.g. inclusion of women and minority members)	Not discussed in the interviews.	

5.2 Results for Engie case, the Netherlands

5.2.1 *Distributive impacts for the closure of Centrale Gelderland 13 (CG13)*

Employment impacts: efficient measures to minimise the negative impacts.

In the years towards the closing around 150 employees were working at the CG13. In 2013, the first round of dismissal was done where around 40 people were laid-off (Interviewee 17, personal communication, April 25, 2019). After the announcement in 2013, the remaining 110 to 100 workers were laid-off. Moreover, interviewees stated that the closing had also indirect employment impacts on the suppliers from products and services such as the 'coal storage park'.

Gender and education levels attained made no difference in job security as all workers were laid-off. However, it did play a role in job opportunity after the closing. Interviewees point out that the majority of the workers had low levels of education, including the workers at the coal storage park (Interviewee 11, personal communication, April 18, 2019). In total Engie employed three women in part-time function. According to the interviewees two of them found a new job easily and the third woman decided not to work anymore.

In order to minimise employment impacts of closing a coal power plant, Engie took several measures. First of all, enforced by law, the social plan[12] was established in which the early pension age was determined. The ex-plant manager was part of the negotiations about the social plan and explained why the pension age of 57 was very important:

"In the end, we agreed with the other stakeholders, such as the labour union, on the early retirement age of 57+ and the salary of 75% of their initial salary. This was very positive as many workers did not expect that they would be eligible for early retirement. These old workers were mostly the workers with low education backgrounds."

[12] A social plan is an agreement between one or more employers and one or more trade unions which consists of rules and regulations to protect the personnel in case of a reorganization or close down.

All interviewees state that the social plan has been very 'luxurious' and provided sufficient arrangements for all the workers to mitigate the negative financial impacts of losing a job.

Aside of the financial arrangements included in the social plan, Engie took several measures to support its workers in their search for a new job, also known as 'work-to-work measures'. In addition, the social plan allowed workers to find new employment on top of their early retirement. So, many of the 'older' workers, retrained themselves and Engie financed these trainings. Interviewee 17, ex-workers, gives a few examples:

"What I dare to say is that we had a very luxury social plan and you won't see that again. It was luxury because we could do a lot outside the benefits. So, a few guys retrained themselves: One got his large goods vehicle license, so he now drives a Cool Blue truck for 2 to 3 days a week. Others got their certificates for taxi drivers and work as school bus drivers. This is very nice for them as these old guys were not very popular on the labour market in their expertise, but they are in transport. Moreover, they can do this job until they retire. This way they can fill the gap of the 25% income lost."

Another work-to-work measure was the possibility for workers to translate competences acquired during their career at Engie into an official certificate. Comparably, was the opportunity to skip certain elements of an education program because they could show that they had acquired certain skills at the CG13. This accelerated their study progress which allowed them to obtain the necessary diplomas before the plant closed. These measures increased the job opportunities of many low-educated workers.
Additionally, Engie established partnerships with companies in related industries to transfer some of their workers to these partners. These partnerships were beneficial to the workers as it eased the searching process, but it was also beneficial to Engie because it allowed Engie to call back their workers in case of emergencies at the power plant. Although not many workers made use of this arrangement, it did help workers to orientate themselves as many companies came to the site to present themselves (Interviewee 11, personal communication, April 18, 2019). Furthermore, trainings were given to improve the LinkedIn- and job application skills of the workers.

Overall, the work-to-work measures were highly effective as in the end only two workers did not find a new job before the closing of the plant. An ex-worker remarks on the success of these measures:

"I think Engie did a good job in helping its workers to enter the labour market as good as possible. I mean, in the last years I obtained three diplomas. It made me much more interesting for the labour market. In the end, I enjoyed the transition allowances that Engie gave to all its employees, and I think it went all fine."

However, Engie employed also several temporary workers, who could not benefit of any of these measures (Interviewee 18, personal communication, May 8, 2019).

Income impacts

Income impacts for the region & municipality is limited

The closing of the coal plant did influence the income of the municipality as Engie paid high taxes to the municipality (Japers, 2013). However, interviewees state that the municipality will move from

centralised to decentralised energy production which will bring new kind of business into the city and will diversified the income sources of the municipality. Moreover, the municipality is phasing out its inner-city industrial area and is replacing it with luxurious houses and new innovative businesses. This is illustrated by the closure of other industrial businesses close to the Engie site such as the slaughterhouse and meat process company closed in 2015 (350 jobs) (Back, 2016) and the Honig factory closed in 2018 (240 jobs) (Vesson, 2019). The impact on the province's income is limited (Interviewee 9, personal communication, May 8, 2019).

Labour income most likely slightly reduced, except for early retired workers

The income from labour is negatively affected as Engie paid relatively high salaries to its workers. Moreover, workers tend to stay their entire career at Engie which made that many of them had obtained a high salary throughout the years. It is likely that in many cases the new salary did not match the old salary for which Engie only compensated the first two years (Interviewee 11, personal communication, April 18, 2019).

Additionally, the workers eligible for the early retirement had an income loss of 25%. However, these workers were allowed to work outside this agreement. To this end, interviewees stated that many workers with this arrangement found new employment, either part-time or full-time. As such, some of the ex-workers are now earning 150% salary which increases their income from labour significantly (Interviewee 18, personal communication, May 8, 2019).

Personal income

For this indicator no information was found.

Income inequality

The case of Engie is too small to measure its impact on income inequality. Although, the CG13 closed together with four other coal fired plants, there are no reports discussing the income inequality impacts.

Limited impacts on economy as there was no dependency on the coal power sector

The closing of the plant has a limited impact on the local economy as there was no regional dependency on the energy sector for income. However, the new kind of business brought into the city will diversify the income sources of the municipality

Innovation and education impacts

For this indicator no information was found. However, it is likely that the clean energy hub, with a technology campus will have an impact.

Energy related impacts

Positive impact on security of energy supply while having a neutral impact on energy prices

Before the closure of the CG13, Nijmegen was self-sufficient in its electricity supply (Haskoning GDHV, 2018). Therefore, with the closure Nijmegen lost an important power generator which needs to be replaced by (clean) energy to be self-sufficient again (Haskoning GDHV, 2018). Moreover, as the electricity demand in Nijmegen will increase in the future, it is a challenge for Nijmegen to meet its energy neutral target by 2049.

However, the closing had no impact on energy prices as the closure was foreseen and there was overcapacity on the grid so the phase-out did not result in energy scarcity which could have affected the energy prices (Interviewee 12, personal communication, April 24, 2019).
The closing of the plant had a positive impact on the security of energy supply as the plant ran on imported coal, which increased the dependency on foreign countries. Additionally, it will also have a positive impact on decentralised clean energy production as it is estimated is that the clean energy hub will generate as much energy as the coal plant did by 2030 (Willems, 2019).

No demographic of tourist impacts

Interviewees state that there is no demographic or tourism impact in the relation with the closure of the CG13.

Will to keep investing in social cohesion among the workers

The social cohesion among the workers has always been high, an ex-worker retired already in 2008, stated:

> *"The last open-day of the CG13 was for me like a reunion of ex-workers. That is really a characteristic of this plant and Engie; the personnel were very involved with the plant and well treated by Engie."*

During the last years of the phase-out, it was difficult to keep this social cohesion as the motivation to keep improving the plant was gone. The workers were only doing the necessary operational procedures such as superficial maintenances, while the plant was slowly degrading. However, the workers at the plant together took the decision that they wanted to keep investing in the community and not to forget the human aspect of such a close-down (Interviewee 17, personal communication, April 25, 2019). Engie supported this decision by organising 12 social events instead of their traditional 4 social events per year. However, as some of the workers had emotional difficulties with the closing, not all workers joined this initiative (Interviewee 17, personal communication, April 25, 2019).

Addition to the evaluation framework

Under the allocation of costs and benefits from the energy transition, the interviewees highlighted that the age of the workers played an important role in finding new employment and an older age reduced chances on the labour market. At the same time, workers above 57 years were eligible for the early retirement program. It therefore seems that there is an 'age gap' in which the burden of the closure of CG13 is the highest. For this reason, **age equality** is added to the framework under qualitative employment impacts.

Additionally, **environmental impacts**, also discussed in the Burgenland case, are seen as important by the interviewees. However, the emphasis is made more towards reducing the environmental nuisance and landscape changes rather than sustaining biodiversity.
Lastly, it was found that ex-workers carried the burden of the bad reputation that the coal sector has obtained over the past decade. Therefore, a **reputation impact** is added to the evaluation framework.

Age equality: the age gap

The age of a worker can negatively affect its chances on the labour market. An ex-worker elaborates on his experience:

"The early retirement age was 57+ and some of the older guys were just under this age. For this group, employers are not standing in the line to hire them, as they are pretty old. The technical world is also a conservative world: you have to work 40 hours and you need to be a man. Old workers do not fit in this image. Furthermore, the work is physically heavy, so many guys who worked there for years had physical complaints and, in these conditions, you had to enter the labour market. That is tough"

Environmental impacts

Mixed feelings about landscape changes, reduced environmental nuisances

Many interviewees remark that after the announcement of the closing, several workers and residents started to ask Engie if they could let the chimney stay because it had become one of the icons of Nijmegen (see Image 9). However, for many households the closing of the plant, was also a relieve as they have always experienced environmental nuisances. In the past, there was a lot of nuisances from fine dust, smell and noise. Additionally, in the 1990s several incidents of cancer were registered in the adjacent neighbourhoods of the industrial area (Interviewee 13, personal communication, May 8, 2019). Although the plant improved over the years, residents still experience hindrances. Interviewee 15, a resident since 1995, elaborates on the nuisance:

Image 7. The 'Waal Bridge' to enter Nijmegen with the iconic CG13 at the background

"Since the closing of the plant, we can clean our houses and they keep clean for a long time. We first had a lot of nuisance from particular matter. Especially when there was wind from the east as the area where they would store the coal was an open area."

Reputation of the sector: from serving society to polluting society

A few interviewees pointed out that the closing brought also another impact, namely a change in their professional reputation. The coal power plant did not only serve as a working place for many people with low levels of education, it was also seen as a utility company serving the society in its energy needs. Current site manager, remarks on this change:

"Before the energy transition, working in a coal plant was like a societal function. It was seen as a utility and had an important role in the society. At the moment, people do not talk positively about people who work in the coal sector. The workers seem to become climate terrorists, people say: it's terrible what happens or happened in there".

Scoring for distributive justice for the closing of the CG13

The indicators of the distributive dimension of energy justice score predominantly positive (see Table 5-4). From the 14 indicators with sufficient information, 10 indicators have a positive score. Due to effective measures the negative impacts of a closure (e.g. employment losses) were mitigated. One interesting founding here was that the closure of the CG13, hit the older and lower educated workers the hardest. Especially the workers in the 'age gap' were found vulnerable to a long-term unemployment. However, effective measures were able to mitigate these negative impacts as, except for two workers, everyone has found a new job.

The three neutral scores are due to mixed impacts which resulted in neither a positive nor negative score. For instance, for the indicator 'Impacts on labour income' it is likely that for many ex-workers the salary reduced. However, for the workers who choose to work outside their early retire program, the salary had increase significantly. Other neutral score is for the indicator 'Landscape-change impacts' as the demolishing of the plant would also take away the iconic chimney of the city. However, other interviewers were happy that it would go away. Lastly, another mixed impact is found in the indicator 'Social cohesion'; for some workers the closure increased the social cohesion while for others it reduced the cohesion. 'Impact on reputation' scores negative, as ex-workers were associated with culprit of climate change.

Table 5-4. CG13: Overview of the results and scoring for distributive justice

Key variable	Indicator	Sub-indicator	CG13 assessment		Scoring
Quantitative employment impacts	Changes in employment	The number of created or terminated jobs/changes in unemployment rate	Within 5 years, 150 jobs were phased-out. Also impacts on indirect jobs, e.g. coal storage park. However, only 2 workers did not find new employment.		
Qualitative employment impacts	Gender equality: job opportunity and job security	The number of new jobs that are allocated to women versus men/ job tenure woman versus men.	In total 3 women in part-time function which did not encounter differences in job security or opportunity.		
	Skill- and education level: job opportunity and job security	The number of new positions that are suited for labour force with low educated versus high educated levels attained	Many low-educated workers. No difference in job security, but difference in job opportunity.		
	Age equality: job opportunity and job security	The number of people in the age gap (too old to get hired, but too young to fit in the social plan)	A large group belonged to the age gap (below 57 but older than ~50).		
Income impacts	Income impacts for the region	Changes in GDP for the region	No impact was found as the case is too small to have significant impacts on the regional income.		
	Income impacts for the municipality	Changes in income for the municipality	Mixed impact as the closure will take away a revenue stream, however, the redevelopment and other new businesses in the area will bring in a new income stream.		
	Income impacts for the (ex-) workers	Changes in labour income	Workers had built-up high salaries, so likely they will not receive same salary in new jobs. Moreover, workers of 57+ lost 25% of their income. However, most of these workers filled this gap by working part-time (or even full-time).		
	Personal income impacts	Changes in personal income	No information available.		
	Income inequality impacts	Changes in income inequality (as indicated by the Gini coefficient)	No information available.		
Economic diversification	Impact on local economy	Changes in the economics sectors of the region	The new kind of businesses, will diversify the income sources of the municipality.		
	Dependency on energy sector	Reduced or increased dependency on the energy sector as an income source for the region	There was no dependency on the non-renewable energy sector.		
Innovation and education impacts	Impacts on technology development	Changes in technology development	No information available.		
	Impacts on education system	Changes in education system	No information available.		
Energy related impacts	Impact on self-sufficiency / decentralise energy	Changes in households' self-sufficiency in energy/changes in decentralised energy production	Interview data	Yes, centralise energy is phased-out in Nijmegen and the area will be used for decentralised energy production	
			Haskoning GDHV data	Nijmegen is not self-sufficient anymore in its electricity production. The redevelopment will make up for the losses. Some say that in 2030 the clean electricity hub will generate as much energy as the plant.	

	Impact on affordability	Changes in energy prices for consumers/households are able to afford the increased prices	No increase in energy prices, because there was an overcapacity on the grid.	
	Impact on energy supply security	Changes in energy supply security	Positive impact on security of energy supply because not dependent on imported coal.	
Demographic and tourism impacts	Migration impacts	Changes in the number of people moving in or out of the region	No impact.	
	Tourist impacts	Changes in the number of tourists	No impact.	
Social cohesion	At the energy site	Employees experience more/less social cohesion	Social cohesion has always been high; however, the closing took away future perspective of the plant which reduced social cohesion. Workers take initiative to keep investing in social cohesion.	
Environmental impacts	Landscape-change impacts	Changes in landscape	Demolishing of the plant will change the landscape as the chimney of the plant was an icon of Nijmegen.	
	Environmental nuisance	Increased/decreased noise, smell and pollutants levels	Surrounding neighbourhoods experienced environmental hinders (noise, smell and air pollution) which stopped after the closing.	
Impacts on reputation	Changes in sector's reputation	The workers in non-renewable/renewable energy sector feel that profession is (un)valued in society	Before the energy transition, workers were serving the society and nowadays, they are seen by some as the culprit of climate change.	

5.2.2 *Recognition justice for the closure of CG13*

Note that from here on the Engie case includes also the sub-case of the redevelopment of the site. The redevelopment was not discussed in distributive justice because it has not yet been completed. For the two remaining dimensions (recognition and procedural), the sub-cases are discussed after each other. So, for recognition justice first the closure is discussed after which the redevelopment is assessed.

Special attention for the low educated and the older workers

Interviewees in leading positions stated that, during the closing of the plant, special attention was given to the group with low levels of education attained. There was also special attention for the older workers which is illustrated by the relative low age for the early retirement program (Interviewee 11, personal communication, April 18, 2019). Additionally, Engie hired only the older workers for the few available positions available for the supervision of the demolishing of the plant. Moreover, special attention in relation to energy consumption and energy poverty is included in the other sub-case; the redevelopment of the Engie site.

Workers felt treated respectfully

The ex-workers interviewed indicated that, under the circumstances, they felt treated respectfully. Every month, Engie would organise canteen sessions, where the personnel were informed by Engie on the latest developments. In these sessions, workers could respond or bring in their own ideas or subject for discussion. In one of the sessions, the previous described idea of investing in social cohesion was brought up by the workers, for instance. The fact that Engie took this idea and implemented it, was appreciated by the workers (Interviewee 17, personal communication, April 25, 2019).

Scoring for recognition justice for the closing of the CG13

The closing of the CG13 scored high on recognition justice (see Table 5-5). However, this is partly because the closing process includes only workers as a vulnerable group. The inclusion of other vulnerable groups is discussed in the sub-case of the redevelopment.

Table 5-5. CG13: Overview of the results and scoring for recognition justice

Key variable	Indicator	Sub-indicator	CG13 assessment	Scoring
Recognition of vulnerable groups: youth, elderly, people with distance to the working place and low-income households	Recognition by policymakers that vulnerable groups in the energy transition should be included	Recognition by policymakers that vulnerable groups in the energy transition should be included	Especially extra attention and measures for workers with low levels of education attainted and the older workers.	
	Recognition by policymakers that these groups might need more than the average energy consumption of households	Recognition by policymakers that these groups might use or need more than the average energy consumption of households	Not relevant for the closing of the CG13.	
	Recognition by policymakers that low income households are prone to or are in energy poverty	Recognition by policymakers that low income households are prone to or are in energy poverty	Not relevant for the closing of the CG13. Discuss in redevelopment of the site.	
Respectfully treated	Governments and energy companies value other (local) opinions	Ideas and arguments against changes to the energy system are (un)heard	In the canteen sessions, workers could bring in ideas.	
		Locals, workers and environmentalist groups indicated that they feel treated (dis)respectfully	Workers felt treated respectfully.	

5.2.3 *Recognition justice for the redevelopment of the Engie site*

Special attention in future plans for workers with low levels of education attained

The management of Engie and the municipality of Nijmegen gave no special attention to youth, elderly or households with low income in their draft spatial vision. However, the municipality recognised the need for low-skills jobs. A policy advisor at the department for spatial development, explains how the municipality takes this group into account:

"If the Engie project creates new jobs, we would really like to see some jobs back for workers with low levels of education attained. We have included this in the concept version of the spatial vision, so we can make sure only business will came back who contribute to such goals. For instance, we would not allow a clean electricity-based package distribution centre where everything is automatic."

Energy poverty: Municipality is aware of the issue, but has no concrete measures

Many of the interviewees were not aware of the issue of energy poverty. However, at municipal level, policymakers are aware of the extra costs the energy transition brings and that poor households will have difficulties paying for these costs which may result in energy poverty. For instance, in the heat vision (see section 4.2.4), Nijmegen state that they want to install a finance system to support house owners and housing associations in their transition towards more energy efficient houses (GNMF, 2016). However, there are no special subsidies that support energy poor households in paying their energy bills

Governments and energy companies value other (local) opinions

Many interviewees state that the arguments against and ideas for the redevelopment of the site were heard by Engie. However, some interviewees argue that this open attitude of Engie is partly due to an incident that happened with the permitting of the wind turbines at the start of the redevelopment (see

Textbox 5). Engie took the reactions of the residents and the municipality seriously. Together with the process director (see section 4.2.3) and the municipality, Engie started to develop a draft spatial vision. Moreover, Engie responded to the residents by inviting them for information sessions and to join a trip to a windmill park so that people could experience the implications of windmills themselves. The process director elaborates on this incident.

"In the Netherlands you can build something by using two approaches. The traditional way is by law which implies you request for permit and within that procedure citizens can protest. This is what Engie did with the wind turbines. Engie did not do anything wrong, but this approach is nowadays not really accepted anymore. With the permitting of the two wind turbines Engie experienced what happens if you do not include the surrounding neighbourhoods, namely a lot of resistance. I believe, that Engie realised the importance of participation and having a good relationship with the adjacent neighbourhoods."

Event with the permitting for the wind turbines: In January 2018, at the last open-day, Engie communicated to the community that it would apply next month for the permit of two wind turbines. This created a lot of resistance by the residents close to the site as this was not expected. Also, the municipality of Nijmegen was surprised by Engie and emphasised on the fact that Engie should first develop a spatial vision before applying for permits (Interviewee 9, personal communication, May 8, 2019).

Textbox 5. Event with the permitting for the wind turbines.

Where possible, Engie limited the hindrance of the wind turbines by 1) reducing the hours of blade rotation shade to zero, 2) installing the quietest wind turbines and 3) building a green noise wall.
Although, there were still opponents to the wind turbines, other residents feel that Engie treated them with respect which created more support for the redevelopment plans. A resident elaborates on this:

"I believe that Engie will do its very best that the residents will not experience any negative side impacts. I'm firmly convinced about this. You notice this in Engie's behaviour. They publish their plans and invite us for input sessions. We also need more clean electricity and the site of Engie has been producing electricity and should be producing electricity in the future. I mean it is Engie's terrain."

As indicated in the quote above, Engie does not only react on arguments against, but also tries to be proactive by inviting residents and companies for information and input session.
However, interviewees from Weurt state that they feel not treated respectfully by the province of Gelderland. A resident from Weurt explains why:

"The reason that we requested an appeal against the permit for the wind turbines is because we feel not well treated by the province. We are angry because the burden of the energy transition, in our feeling, is not equally shared; we always experienced hindrance from the CG13 and now we will experience nuisance from the wind turbines. The province is not taking our interest in consideration and only thinks of meeting its wind energy targets."

Scoring for recognition justice for the redevelopment of the site

For recognition justice, the redevelopment scores on two indicators high and on two indicators medium (see Table 5-6). The redevelopment of the Engie sites scores high on 'Recognition of vulnerable groups'

and ‘Ideas and arguments against are heard’. On ‘Recognition of energy poverty’ and ‘Respectfully treated’ the redevelopment of the sites scores medium. For the latter, this is because not all interviewees felt respectfully treated by all decision-making parties.

Table 5-6. Redevelopment: Overview of results and scoring for recognition justice

Key variable	Indicator	Sub-indicator	Redevelopment assessment	Scoring
Recognition of vulnerable groups: youth, elderly, people with distance to the working place and low-income households	Recognition by policymakers that vulnerable groups in the energy transition should be included	Recognition by policymakers that vulnerable groups in the energy transition should be included	Special attention is given to unemployed group of low-educated people. The new jobs should mainly benefit this group. Other vulnerable groups are not taken in consideration.	
	Recognition by policymakers that these groups might need more than the average energy consumption of households	Recognition by policymakers that these groups might use or need more than the average energy consumption of households	Not discussed in the interviews.	
	Recognition by policymakers that low income households are prone to or are in energy poverty	Recognition by policymakers that low income households are prone to or in energy poverty	Special attention for the affordability of the energy transition. Energy poverty is addressed by ambitious agreements with housing associations and a financial system to support house owner in their energy and heat transition.	
Respectfully treated	Governments and energy companies, they value other (local) opinions	Ideas and arguments against changes in the energy system are (un)heard	Yes, the arguments against are heard as Engie invited them for information sessions and reduced the hindrance.	
		Locals and environmentalist groups indicated that they feel treated (dis)respectfully	Overall, people feel treated respectfully. Some interviewees of Weurt feel not correctly treated by the province as they find that the province has not protected them.	

5.2.4 *Procedural justice for the closing of the CG13*

Inclusiveness and participation

During the closure, the relevant stakeholders were; the full-time workers, the temporary workers and the management team. The management team met once a week and did not include the workers in decision making (Interviewee 17, personal communication, April 25, 2019).

In the monthly canteen sessions, there was only little opportunity to participate in decision-making. An example is the idea to put extra effort in community building. Moreover, interviewees state that there was a ‘healthy line’ in what the management would take in consideration and what not. Especially as some workers were emotionally affected and tended to show resistance out of protest against the closing (Interviewee 17, personal communication, April 25, 2019).

During the closing, several sub-projects started to enable a smooth phase-out. In these projects, the workers were involved in decision making (Interviewee 11, personal communication, April 18, 2019).

Mobilisation of knowledge

All the information was clustered on a website developed specially for this purpose. Here, the first plans for the redevelopment were posted under the name ‘Green Delta’ (Groene Delta). However, the ex-

workers indicate that the website was barely used as the canteen sessions were already very informative. An ex-worker tells about his experience:

> *"Well, I mostly went to the canteen sessions. I checked the website only once and very briefly. I only wanted to know how much I would get and for how long. And I trust Engie in this."*

Transparency

The decision about the closing of the plant was communicated through the press and the Energy Agreement. However, there is not a lot of transparency on how this decision was taken (Interviewee 11, personal communication, April 18, 2019). While the information discussed in management team meetings was mostly not transparent, interviewees stated that they felt that Engie was very transparent during the period of the phase-out. The canteen sessions played a big role in this.

Representation in institutions

Most interviewees were not aware of this topic and has been excluded from this sub-case.

Addition to the evaluation framework

Interviewees state that it was not only about transparency, but also about the way information was communicated. To make this distinction clear, a new key variable is added, namely **communication.** Under this variables falls the indicator of **Clear and open communication** as this has been pivotal during the closing because there were many uncertainties.

Clear and open communication

The canteen sessions also served to inform the workers about the latest developments. After the announcement of the closing, there was not yet a social plan in place as Engie needed to wait for laws and regulations from the national government about social security. It took three months which created unrest among workers as it was not sure how their future would unfold (Interviewee 11, personal communication, April 18, 2019). An ex-worker remarks on the importance of the canteen sessions in this period:

"These canteens sessions were there to prevent unrest to grow. To answer the questions of the workers, because you know when you do not talk, there will be unrest."

Scoring of procedural justice for the closing of the CG13

Overall, the sub-case of the closure of the CG13 scores high on the indicators of procedural justice (see Table 5-7). The only medium score ('Availability of information') is due to less insights in top down decisions.

Table 5-7. CG13: Overview of results and scoring for procedural justice

Key variable	Indicator	Sub-indicator	CG13 assessment	Scoring
Inclusiveness	Relevant stakeholders are involved	All relevant stakeholders were included in the decision-making process	Not many stakeholders, but all were included during canteen sessions	
Participation	Participation in decision-making process	Workshop and input sessions were organised where stakeholders could	In the monthly canteen session, workers could provide input and give feedback on decisions.	

		participate in decision making	Moreover, they could join projects.	
	Altered decision making	Ideas and arguments for changes to the energy system are feed in the decision-making process	Some ideas from the workers were put into practice, but they had no saying in big and strategic decisions. Some workers state that there was a good balance in what was taken into account by the management team and what not.	
Communication	Clear and open communication	There is clear and open communication from decision-makers to stakeholders and vice versa	Social plan brought clarity but was in the first 3 months not yet available. Canteens sessions brought clarity.	
Mobilisation of knowledge	Knowledge about the topic is provides	Informative websites and information sessions are offered to provide the general public with relevant knowledge	Canteen sessions were also used to provide practical information about the way forward.	
		People indicate that they understand the topic	Workers stated that they understood the implication of the social plan and the way forward.	
Transparency	Availability of information	Information about important decisions, results of environmental impacts reports, financial reports etc., are publicly available	Closing was announced by the press and in the SER. Website and canteen sessions increased transparency.	
	Easy accessibility of information	Information is easy to find and to access	Precise information about the national government's decision to close the plant is hard to find.	
Representation in institutions	Equal representations of society	Decision-making bodies have an equal representation of society (e.g. inclusion of women and minority members)	Not discussed in the interviews.	

5.2.5 *Procedural justice for the redevelopment of the Engie site*

All relevant stakeholders are involved

The process director created an organisation structure in which all relevant stakeholders are included (see Figure 5-2). The most important stakeholders such as Engie, municipality of Nijmegen and Weurt, the province and projects leaders are represented in the core team where decision are made. The more strategic questions are discussed in the board group in which the direction of Engie and the alderman of Nijmegen take seat. Below the core team, there are project teams with different tasks e.g. writing the area vision or the environmental impact report. In these project teams environmental and spatial planning experts are involved. Additionally, the council members from the two municipalities are updated all together in case of new developments (Interviewee 10, personal communication, April 16, 2019). There is also a 'consultation group' established in which representatives of adjacent neighbourhoods and companies can provide feedback on ideas.

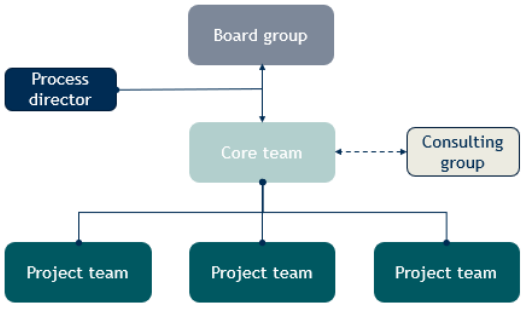

Figure 5-2. Organisation structure of the redevelopment

Other stakeholders were included by organising information and input sessions. These stakeholders are among others Rijkswaterstaat,[13] water boards and a platform 'Kronenburg Forum'. The latter is an independent advisory body that exchanges knowledge and information and formulates a joint ambition for the area. Members of this platform are NGOs, local citizens, companies and politicians (Interviewee 11, personal communication, April 18, 2019).

Participation: Many stakeholders can participate in the process of decision making

The final approval on the spatial vision is done by the municipality and as landowner Engie can determine what they want to include in this spatial vision. However, in the spirit of the Environment and Planning Act and after the lessons with the early permitting for the wind turbines, Engie decided to start an extensive participation process. It held several workshop and input sessions were stakeholders could give feedback on new ideas and could bring in new ideas. The process director explains the implication of this new and flexible Environment and Planning Act:

"The reduced complexity that comes with new Act makes also that spatial developers need be sure that the plan is 'grounded' which means involving the community. So, you need to ask residents what they think about it, what they expect and where there are afraid for. This is one of the main aspects of the new Act. As you can see now with Engie, we had a lot of contact with the surrounding, but we have not yet given any permit yet."

The current site manager of Engie highlights that with the energy transition this flexibility in spatial planning is necessary. However, this flexibility makes participation even more important as stated by the site manager of Engie:

"We see that all parties don't exactly know how things will evolve. We also need to get use to this. Everyone sees the importance of the energy transition and the function of a local zoning plan for this area and that the plan needs to be a bit flexible. We need the flexibility to act and react. At the other hand, people find it scary; if we don't define the boundaries of what is allowed and not allowed on this area, then it could be basically everything."

It is important to continuously keep involving residents and companies in the participation process, now and in the upcoming years. Additionally, Engie announced that they want to allow financial participation by selling the shares of the wind turbines to the local community (Interviewee 12, personal communication, April 24, 2019). Moreover, Engie is planning on developing a 'local fund' in which Engie will make available €10.000 to €15.000 annually to subsidise local projects so that the surrounding neighbourhoods also benefit from the wind energy.

Based on this participation process, the companies and residents were able to influence the decision-making process. Several ideas were taken over such as growing crops under the solar panels (ENGIE Energie Nederland, 2019). However, Engie remains the landowner and therefore has the final say.

[13] Rijkswaterstaat is part of the Dutch Ministry of Infrastructure and Water Management and responsible for the design, construction, management and maintenance of the main infrastructure facilities in the Netherlands, such as the water ways.

Mobilisation of knowledge: many efforts in informing the local community

Several information sessions were held by Engie, including a tour around the site to show people the plans. A trip to a windmill park was organised to let people experience the impacts of windmills. To help people visualise the impact of the windmills at the Engie side, there were animations which, based on your zip code, could project how the windmills would affect your view. Additionally, there is a website containing all relevant information concerning the demolishing and the redevelopment plans. On this website, Engie posts its monthly newsletter. The residents interviewed indicate that they understand the matter and they come across very knowledgeable. However, the site manager emphasises on the complexity of the issue:

"It takes a lot of time to organise these visits and to teach people to understand energy. Often, I ask them the question; do you know what the production of this solar park is compare to the CG13? And then you notice that people have no feeling with energy. What the solar park produces in one year is the same as the plant would do in 4 hours. This makes people think."

Moreover, interviewees from Engie and the municipality indicated that it is hard to reach all residents in the adjacent neighbourhoods and that the events eventually attracted more or less the same people.

Transparency: not all parties are perceived as transparent

After the windmill permitting event Engie increased its transparency. On the website all kinds of information are available. Additionally, Engie was very open about what feedback from the residents and companies they would include and what they would not (Interviewee 10, personal communication, April 16, 2019). Some interviewees who know Engie for a long time are surprised by Engie's open attitude.
The municipality works closely with Engie in their communication towards the public as they want to be transparent (Interviewee 9, personal communication, May 8, 2019).

Although the province indicates that they tried to be as transparent as possible, some interviewees state that the Province should be more transparent, especially regarding the plans of the windmills.

Representation in institutions: not possible to represent the opinion of the whole neighbourhood

Engie expresses it concerns about representation in the neighbourhood's associations, with which Engie works close. However, the interviewees of these boards are also aware of this issue and do not tend to speak for the whole neighbourhood.

Addition to the evaluation framework

In this last dimension of justice, interviewees point out that the role of **feedback** appeared to be important in the participation process. Therefore, feedback has been added as sub-indicator of clear communication. Lastly, to the key variable of transparency, it is added whether stakeholders are aware of the availability of certain important documents as this was found problematic in the Engie case.

Clear feedback and clear communication

Part of the participation process is the special attention to feedback. Not only feedback from residents and companies on the ideas generated by the core team, but also the feedback from Engie towards ideas and arguments from citizens and companies (Interviewee 10, personal communication, April 16, 2019).

Overall, interviewees state that the feedback loop was very good in both ways. This is illustrated by five pages of feedback published by Engie on the ideas of the residents and companies about the redevelopment. In this document, Engie state clearly which suggestions they will take over, which ones they are going to look further into, and which ones are not possible, supported by arguments. In addition, Engie asked the residents and companies how they would like Engie to communicate with them (Interviewee 16, personal communication, May 22, 2019).

Transparency: people are not aware of the availability of certain documents

When zooming in on the availability of information, it appears that some important documents, such as the Wind Vision, in which the province selected suitable areas to install wind turbines, are available, but people do not know about it. A resident from Weurt expresses its concerns:

"We would like the know how many wind turbines the province is planning to build in the rest of the province. We just don't know that. We have the feeling that things are not totally thought through and we would like to have more insights in their decision-making process."

For the above-mentioned reasons, some residents of the neighbourhood Weurt, handed in a formal information request under the Public Access to Governmental Information Act (Wet Openbaarheid van Bestuur (WOB)). However, even with this request, the residents do not receive much more information, as described by a resident of Weurt:

"In January 2019, we applied for a WOB request at the province. However, they already exceeded the deadline and we still don't have any information. Also, the municipality of Nijmegen was slow in their information providing and did not show that much. This gives us the idea that they are doing something secret. So, there is not much transparency about what is going to be policy and how it became a policy."

Scoring of redevelopments of the Engie site

The redevelopment of the Engie site scores high on all the indicators for procedural justice except the ones in relation to transparency (see Table 5-8). Despite the incident with the permitting for the two wind turbines, the case scores high on inclusiveness and participation. The reason for this is that although the hasting permitting of the wind turbines lacked any participation and created resistance among the residents, Engie learned from this and now possess a highly inclusive and open participation process. For this reason, the incident is treated as part of the whole participation process and here Engie case scores generally high. The medium scores for the indicator of transparency are based on the fact that governments, and especially the province, failed to timely disclose important information. Even though some documents are accessible via internet, citizens were not aware of the availability of these documents.

Table 5-8. Redevelopment: Overview of results and scoring for procedural justice.

Key variable	Indicator	Sub-indicator	Redevelopment assessment	Scoring
Inclusiveness	Relevant stakeholders are involved	All relevant stakeholders were included	Yes, by new organisation structure and by several information and input sessions	
Participation	Participation in decision-making process	Workshop and input sessions were organised where stakeholders could participate in decision making	Yes, many workshop and input sessions were organised. Additionally, citizens can financially participate by buying shares of the wind turbines.	
	Altered decision making	Arguments against or in favour of the creation/destruction are feed in the decision-making process	To some extent as Engie will build a noise wall, silent windmills and will make sure that there is no blade rotation shade. Moreover, several ideas from citizens are put into practice.	
Communication	Open and clear communication	There is open and clear communication from decision-makers to stakeholders and vice versa	The plans for the windmills were not well communicated. However, ever since, Engie is very clear and honest in its communication.	
		On the input of the stakeholders there is clear feedback given by the company/government	Very extensive feedback on the input of residents and companies.	
Mobilisation of knowledge	Knowledge about the topic is provided	Informative websites and information sessions are offered, to provide the general public with relevant knowledge	A website with all information is available. Many information sessions were held to exchange knowledge.	
		People indicate that they understand	yes, but topic is new and complicated.	
Transparency	Availability	Notes of important meetings are publicly available & reports such as environmental impact report are available	Engie became very transparent (online newspaper, website and information sessions). People are surprised about Engie's open attitude.	
	Easy accessibility	Information is easy to find on national/local governments' websites and companies' websites	Province responded slow on request for more information.	
		People are aware of the existence of information/reports	Some interviewees indicate that they were not aware of/informed about the existence of some documents	
Representation in institutions	Equal representations of society	Decision-making bodies have an equal representation of society (e.g. inclusion of women and minority members)	In community boards, the representation of the neighbourhoods is questioned.	

5.3 Revised evaluation framework

Part of this study is to revise and specify the evaluation framework for energy justice, as indicated in sub-question 5: 'What lessons for revising and specifying the evaluation framework can be drawn from its empirical confrontation?'. To this end, this sub-section shortly discusses the revised framework. In Table 5-9 (See Textbox 6 for explanation of the Table) the revised evaluation framework is presented.

Based on the Burgenland case, the distributive impacts on the environment (biodiversity, landscape changes, nuisance) were added. The recognition of the needs of nature was also incorporated in the recognition justice, together with the recognition of the needs of future generations.

In the Engie case, the qualitative impacts on employment were further specified as it was found that especially workers with an older age had difficulties finding new employment. Additionally, during and after a coal phase out, a negative distributive impact was found, namely the bad reputation in society. Furthermore, the Engie case also revealed the importance of environmental impacts (landscape changes and nuisance).

Based on the Engie case the key variable of 'Communication' was added to procedural justice to not only include transparency, but also specify the way information is communicated. Lastly, incorporated in the key variable of 'Transparency' was the indicator that assesses whether stakeholders are aware of certain important documents as this was found problematic in the Engie case.

	Added variable or indicator
	Variables or indicators from energy justice literature
	Variables or indicators from energy transition literature
*	Based on the Burgenland case
**	Based on the Engie case
No*	Based on both case-studies

Textbox 6. Inscription of Table 5-9.

Table 5-9. Specified justice framework with weighting per indicator

Dimension	Key variable	Indicator	Sub-indicator
Distributive 	Quantitative employment impacts	Changes in employment	The number of (in)direct created or terminated jobs/changes in unemployment rate
	Qualitative employment impacts	Gender equality: job opportunity and job security	The number of new jobs that are allocated to women versus men/ job tenure woman versus men.
		Skill- and education level: job opportunity and job security	The number of new positions that are suited for labour force with low educated versus high educated levels attained
		Age equality: job opportunity and job security**	The number of people in the age gap
	Income impacts	Income impacts for the region	Changes in GDP for the region
		Income impacts for the municipality	Changes in income for the municipality
		Labour income impacts	Changes in labour income
		Personal income impacts	Changes in personal income
		Income inequality	Changes in income inequality (as indicated by the Gini coefficient)
	Economic diversification	Impacts on local economy	Changes in the economics sectors of the region
		Dependency on energy sector	Reduced or increased dependency on the energy sector as an income source for the region
	Innovation and education impacts	Impacts on technology development	Changes in technology development
		Impacts on education system	Changes in education system
	Energy related impacts	Impacts on self-sufficiency in energy/decentralised energy production	Changes in households' self-sufficiency in energy/changes in decentralised energy production
		Impacts on affordability	Changes in energy prices for consumers
			Changes in energy poverty rate
		Impacts on energy supply security	Changes in energy supply security e.g. reduced import dependency
	Demographic and tourism impacts	Migration impacts	Changes in the number of people moving in or out of the region
		Tourist impacts	Changes in the number of tourists
	Environmental impacts	Biodiversity impacts*	Changes in variety of species and numbers
		Landscape impacts	The aesthetics/image of the landscape changes
		Environmental nuisance	Increased/decreases noise, smell and pollutants levels
		CO_2 emissions impacts*	Reduced CO_2 emission in energy consumption
	Social cohesion	Impacts on collective feeling	The community experience changes social cohesion
	Reputation impact	Changes in sector's reputation**	The workers in non-renewable/renewable energy sector feel that profession is (un)valued in society
Recognition 	Recognition of vulnerable groups: youth, elderly, people with distance to the working place and low-income households	(Special) attention for vulnerable groups in energy transition	Recognition by policymakers that vulnerable groups in the energy transition should be included
		(Special) attention for energy consumption of vulnerable groups	Recognition by policymakers that these groups might need more than the average energy consumption of households
		(Special) attention for energy poverty in the energy transition	Recognition by policymakers that low income households are prone to or in energy poverty
	Recognition of the needs of future generations	(Special) attention for future generations*	Recognition by policymakers that action now, will jeopardize the opportunities of future generations
	Recognition of the needs of nature its biodiversity	Special attention for flora and fauna in policy making*	Recognition by policymakers that nature is important for safeguarding the earth and that the nature has right and needs as well.

	Respectfully treated	Governments and energy companies value other (local) opinions and treat people with respect	Ideas and arguments against the changes to the energy system are (un)heard
			Locals and environmental NGO's indicated that they feel treated (dis)respectfully
Procedural	Inclusiveness	Relevant stakeholders are involved	All relevant stakeholders were included in the decision-making process
	Participation	Participation in decision-making process	Workshop and input sessions were organised where stakeholders could participate in decision making
		Altered decision making	Ideas and arguments for changes to the energy system are feed in the decision-making process
	Communication	Open and clear communication**	There is open and clear communication from decision-makers to stakeholders and vice versa
			On the input of the stakeholders there is clear feedback given by the company/government
	Mobilisation of knowledge	Knowledge about the topic is provides	Informative websites and information sessions are offered to provide the general public with relevant knowledge
			People indicate that they understand the topic
	Transparency	Availability of information	Information about important decisions, results of environmental impacts reports, financial reports etc., are publicly available
		Easy accessibility of information	Information is easy to find and to access
		People are aware of the availability of information**	People are aware of the existence of information/reports
	Representation in institutions	Equal representations of society	Decision-making bodies have an equal representation of society (e.g. inclusion of women and minority members)

6. Conclusion, discussion and recommendations

6.1 Conclusion

This study addresses the question: 'What are relevant metrics to assess energy justice and what governance practices have demonstrated a positive contribution to energy justice?'. This question was based on the need to bridge the gap between policy making and energy justice so that energy justice will be used as a tool for policy makers to realise a just energy transition.

To answer the question, first an evaluation framework was developed based on literature of energy justice but also broader literature on energy transition. The framework was based on the three dimensions of energy justice which breaks energy justice down into distributive justice, recognition justice and procedural justice. These dimensions reflect the questions on the what, the who and the how of social justice. This framework was empirically tested on two case studies, one in Austria and one in the Netherlands. By the application of the evaluation framework the cases were assessed, and both cases scored overall high on the three dimensions of justice. Subsequently, several best practices were identified which then addresses the second part of the research question.

The Burgenland case shows best practice in using the energy transition as a tool to boost a region economically, socially and environmentally. Not only was there economic growth and a more diversified economy, it can also be assumed that this growth was inclusive as poverty rates went down and the increased disposable income per household was relatively fairly distributed among the citizen of Burgenland. Moreover, the benefits of the energy transition such as increased revenues for municipalities are shared with the community.

The literature on energy justice warns for increased energy prices or regressive energy policies a result of the energy transition. However, in the case of Burgenland the energy transition did not increase energy prices and energy policies were progressive as low-income households are exempted to pay the electricity surcharge. Moreover, to ensure access to energy for all households, there is a heat subsidy available for low-income households. Environmentally, the energy transition has lowered the CO_2 emissions and safeguards many birds and bat species. As a result, the people of Burgenland are proud of what the region has achieved which also leads to a positive impact on the more social indicators i.e. social cohesion. Best practice in recognition justice is the recognition of the needs of future generations and nature in policy making. For procedural justice, the Burgenland case had a good system in place to ensure that decision making was inclusive, and stakeholders could truly participate. This applies for both the instruments of regional and the local zoning planning.

The Engie case demonstrates the best practices in mitigating the negative impacts that come with a phase-out e.g. employment impacts including age and education impacts. Moreover, the Engie case did not have any negative impacts on the energy system. The closing even enabled the diversification of the economy as the clean energy hub will attract many different businesses. During the closure, the Engie case shows best practices in achieving recognition justice as there were extra measures for the vulnerable groups (older and low educated workers). Also, the monthly canteen sessions are seen as best practice

as this enabled clear communication to take away uncertainties. It was also the right platform the inform the workers about their rights and the procedures of the closing.

For the redevelopment, the Engie case illustrates best practices in respectful treatment of opponents' voices as the opponents were not treated as ignorant and were taken seriously. On procedural justice, the case has the right organisational structure in place to include all relevant stakeholders. Important here was the role of the process director to set this structure up and to align the perspective of the different stakeholders. Lastly, the clear communication including the extensive feedback on input from residents and companies, shows best practices in creating support for a clean energy project by using the right procedural tools. The best practices are translated into recommendations and discussed in section 6.3.

After the empirical confrontation, the evaluation framework was further specified and revised. Some indicators were added to the framework such as 'Age equality', as it was found that this qualitative employment impact would negatively influence chances for ex-coal workers on the labour market. Additionally, during and after a coal phase out, a negative distributive impact was the bad 'Reputation in society' the ex-workers had to cope with. Furthermore, 'Environmental impacts' (biodiversity, landscape changes, nuisance) where added to the framework as interviews indicated that these impacts were important. Included to the dimension of recognition justice are the groups: 'Future generations' and 'Nature'. The procedural dimension was enriched by adding nuances in how communication towards stakeholder should be done, namely open and with clear feedback loops. Lastly, added to key variable of transparency was the indicator that assesses whether stakeholders are aware of certain important documents as this was found problematic in one of the cases.

In conclusion, not only did this study developed an evaluation framework for energy justice, the study also showed how complex energy justice is; to define and to assess it. Furthermore, the results of this study were very rich as it was evidenced that energy justice concerns many aspects of the energy transition, from energy availability and affordability now and in the future, to concerns about nature and employment impacts. Therefore, the evaluation framework for energy justice offers the way forward to govern the energy transition and consequently meet the renewable energy targets.

6.2 Discussion

This study produced a specified and validated framework to assess energy justice. Moreover, it found multiple best governance practices in promoting energy justice. However, a few methodological limitations need to be discussed to provide nuances in some of the results. These imitations should also be considered for future use of this framework. In addition, this section discusses the contribution of the study to the existing literature.

6.2.1 *Reflection on research approach*

Data availability

This study is one of the first to develop an empirically evidenced framework based on the three dimensions of energy justice. Consequently, the framework is very comprehensive as the three dimensions cover a wide variety of aspects of the energy transition. Furthermore, this framework is designed for assessing energy justice on the regional and local level, whereas other metrics for energy justice are developed to assess energy justice at national level. Although these characteristics result in a comprehensive and detailed framework, it has also a downside as it makes the framework data intensive. This may have implications for future research (see sub-section 6.2.2).

To allow for sufficient data, a mixture of different data sources was used; qualitative as well and quantitative (both micro and macro data). However, for some indicators there was no reliable data available due to (1) the complexity of some indicators (energy poverty and income inequality) or (2) nonregistered or not available data (migrant workers or number of fired temporary workers). Additionally, the interviewees were sometimes not aware of the certain issues, such as representation in institutions. To guarantee the internal validation of this study, other data resources were consulted such as regional reports on poverty reduction and/or another closely related indicators were included. This was for instance the case with income inequality, where there was only one reliable year available. However, by looking at the trend in reduction overtime in the rate of people living under the poverty threshold, it is likely the energy transition did not increase income inequality. However, for such indicators it is important to make nuances when making conclusions.

Data gathering; differences between the two cases

The differences in scale of the cases was very helpful in revising and specifying the framework as the different levels showed a variety of findings on different detail level. However, for evaluation purposes, it can be argued that the framework was better triangulated at regional level as there was more statistical data available for the Burgenland case. Additionally, as the case Burgenland was more mature, distributive impacts were better reflected in statistical data bases. The Engie case was at local level and relatively young. For this reason, some impacts could not be traced down in statistics (yet).

This did not hamper the internal validation as the interviewees of the Engie case were able to remember all the events very detailed and lively, whereas the interviewees in the Burgenland case would only remember the big events and mentioned less details. Moreover, the Engie case had more (policy) documents available from which data for triangulation could be derived. However, this way of collecting data is more time consuming than the use of data bases as the OECD data base or national statistics. Therefore, in future research (see Section 6.2.2) it is advised to apply the evaluation framework on regional level or if needed on local level, but then for more mature cases.

Another option is to consider the cumulative impacts of several local projects. For example, in the Engie case, municipality's income impact was assessed by taken into account the transformation of the whole industry terrain into an area for trendy businesses and luxurious apartments.

6.2.2 *Future research*

Correlation with the energy transition

For many variables and indicators from the evaluation framework, the causality with the energy transition was evident and grounded in literature. For instance, the employment impacts in the case of Engie were all directly linked with the energy transition. However, for some of the indicators, the correlation with the energy transition is debatable. For instance, it is arguable to what extent the boost in the tourist sector in Burgenland correlates with the energy transition. The organised tours to the wind parks are certainly not the only reason for the increase in tourists. Therefore, for future use of this framework regression analysis should be conducted for some less evident indicators, to test the correlation. However, due to time limitation, this was not possible for this study.

Expanding geographical scope

The two case studies were selected for their different contexts (institutional and energy related) to maximise the diversity of findings. Based on the results of these two case studies it can be concluded that the framework worked different for each case and different findings were derived from both cases which enriched the framework. However, for future research it would be interesting to expand the geographical scope of this framework to see how different indicators gain importance in for instance a region in Eastern Europe or a community in Brazil. Additionally, the evaluation framework needs to be seen as a starting block as it should be further improved by applying it on more case studies, including less successful or unsuccessful cases.

Weighting of different dimension and indicators

In this study, the three dimensions and their indicators were weighted equally. However, based on the interviews some of the indicators within the dimension were found more important than others. There are different scientific arguments about why one dimension should weight more than another. For instance, when looking at the pyramid of Maslow which illustrates the hierarchy of human need (Maslow, 1943) it could be argued that distributive justice is the most important as for instance security of employment is a human need. However, Dr. Jenkins argued in the expert interview that some resources are inescapably unevenly distributed in the world and that therefore recognition and procedural justice are the most important as they communicate this mal distribution or protect communities in this mal distribution.

In future research, it would be interesting to focus on the different weightings between and within the three dimensions by for instance conducting a survey to learn systematically what aspects of the three dimensions people find most important. Furthermore, for future use, more research should be done on the interactions between and within the dimensions so that trade-offs and synergies can be better recognised.

Extra attention for recognition justice

The evaluation framework is very comprehensive and can help policy makers to include vulnerable groups, such as elderly and low-income households in energy policy. However, as triangulation of this framework was partly done by statistical data, some vulnerable groups in society were not recognised as these groups are not registered and/or not traceable in the statistics. For instance, based on the interviews and the statistical analysis it was concluded that the impacts on migration were limited in this study. However, Dr. Stevis, one of the interviewed experts, pointed out that the evaluation framework most likely had misrecognized this group of migrant workers. It is expected that in the Burgenland case, migrants are taking over the low-paid jobs as the Austrians are now in better paid jobs. Indeed, in one of the interviews, it was mentioned that there are almost no Austrians working in the hotel sector and that these jobs are mostly taken by migrants from Hungary, Slovakia and Slovenia. So, Ironically, this group of migrants, who are a vulnerable group in the energy transition was misrecognised in this study due lacking statistics.

The same accounts for the temporary workers and the 'indirect workers' in the Engie case. Engie outsourced many of its services such as the logistics of the coal (indirect workers) and it was mentioned by a few interviewees that there were also temporary workers in the plant. Although the numbers of these indirect workers and temporary workers are unknown, it is likely that this is group was worse off than the fulltime workers as there was no social plan in place for these workers. Moreover, workers in these positions often have low education backgrounds and/or migration backgrounds, which lowers their chances on the labour market. Therefore, it could be stated that this is another unrecognised group in this study. In future research, migrant-, indirect, - and temporary workers should be part of the evaluation framework.

Data intensity and its considerations

As aforementioned, the framework is data intensive which can be seen as a limitation as it requires a lot of data and time in order to apply this framework on a certain case. To tackle this problem, it could be decided in future research to include less indicators. However, the (social) justice impacts of the energy transition transcend social, environmental, economic and technical questions. Addressing broader indicators than for instance GDP, has become a key policy objective for many institutions such as reflected in the global Sustainable Development Goals (SDGs). Moreover, inequality (e.g. gender, education, but also income inequality) are not reflected by GDP. Therefore, for future research, it is advised to maintain the comprehensiveness of the evaluation framework. Furthermore, as many data bases such as Eurostat, are including and updating more social indicators, it will be easier for future research to apply this framework.

6.2.3 *Contribution to literature*

Contribution of the evaluation framework to energy justice literature

The developed evaluation framework contributes to the existing scientific literature on energy justice in four ways. First of all, it contributes to literature on energy justice metrics as there is limited insights in the operationalisation and quantification of energy justice. More, specifically, this evaluation framework is one of the first frameworks that operationalised the three dimensions of energy justice and is evidenced empirically. It can therefore be stated that the evaluation framework of this study contributed not only to the literature of metrics to measure energy justice but also enriched the literature by using a different approach to energy justice (see Textbox 7).

Expert interviews: key points about contribution to literature.

1. There is a lot written on energy justice but not much is said about what to do with it or how it can be used in practice or in different contexts. With this evaluation framework first steps are made. In more detail, the framework contributes as it is:
   - more comprehensive than previous developed frameworks;
   - validated by collecting stakeholder feedback;
   - one of the first to operationalise the three dimensions of energy justice.
2. The inclusion of the human-nature relationship is important as this theme is often overseen.

Textbox 7. Summary of the key points discussed in the expert interviews

Another important contribution is the inclusion of nature in the framework, both in distributive justice and recognition justice. By the inclusion of nature (biodiversity, landscape changes and nuisance), the framework moved away from the anthropocentric view on the energy transition and put more emphasis on human-nature relationship. In a study by Sovacool (2017), this non-anthropocentric notions of energy justice was shortly discussed but was not quantified or further evidenced based. In the same vein, the framework makes a contribution incorporating the recogntion of other hidden groups such as the future generations.

Furthermore, the framework is applicable on both closing of energy related systems (e.g. closure of coal fired plant) and opening of energy systems (e.g. erection of wind turbines). By including the closing of an energy system, the framework can be used on different aspects of the energy transition and does not limit itself to either the closing or opening of an energy system which is done in many other studies in relation to just energy transitions.

The evaluation framework and its relation to other forms of justice

Overall, it could be argued that the evaluation framework fits within different approaches of justice. The inclusion of vulnerable groups in the framework relates with the egalitarian approach which is based on Rawl's difference principle (1972) which maximises the welfare of the worst-off person.

This notion can even be extended to cosmopolitanism perspective on justice. The cosmopolitan philosophy believes in the ‘world citizens’ and that there are no boundaries of nation states, as there is in egalitarianism. Heffron et al. 2015, argue that due to climate change the approach for environmental protection is more in the light of cosmopolitism philosophy as environmental problems do not limit

themselves to state's boundaries. Despite the fact that the evaluation framework is for regional and local, it does include the notion of world citizens. This notion is even extended to future generations.

The three dimensions of this framework also include a more critical perspective on the creation of injustice as result of misrecognition due to social status and identity, misrepresentation of political voices in societal institutions and overall the recognition maldistribution of economic benefits and burdens (Fraser 2009).

In addition, the inclusion of energy poverty in the evaluation framework also touches upon the capabilities approach by Amartya Sen (1997). McDermott et al. (2013) defines capabilities as *"the capacities necessary for individuals to fully function in their chosen lives, the freedom and wherewithal to pursue the lives they value* (P. 419). Policies should include the fact that humans have different set of capabilities and therefore different needs. For instance, chronically ill people tend to need higher-than-average room temperatures and consequently increased energy prices will affect these people more. This approach differs from the egalitarianism as the focus here is not on means (e.g. income) but on ends (e.g. ability to heat homes).

6.2.4 *Contribution to policy making*

Different forms or justice and policy implications

Although different approaches or perspectives on justice are implicitly presented in the evaluation framework, the egalitarianism perspective dominates. This could be problematic as this approach is difficult to implement in a society where policymakers have stringent budgets. For the budget allocation, policy makers tend to rely on utilitarianism approach of justice which takes in consideration the average gains and losses of a certain policy (Ikeme, 2003). This theory builds on John Stuart Mill's 'Greatest happiness Principle' (1998) which justifies an action based on the greatest amount of pleasure and/or the least amount of pain for the greatest number. It is true that in both cases, the existing budgets were sufficient to pay extra attention to vulnerable groups and to focus on maximising positive impacts and to minimise the negative impacts.

It could therefore be that the evaluation framework is less attractive for policy makers to use. Even more, some policy makers might not want to discuss justice implications at all as they might not align with the opinion of their electorate or it would imply that other more popular measures cannot be implemented. Moreover, the evaluation framework risks that in use of e.g. policy makers, some elements are prioritised and named 'just'. Based on these limitations, it could be argued that the framework is too idealistic and the usefulness for policy makers is debateable.

Energy justice as a tool to achieve a just energy transitions

Is then energy justice a tool to realise (a just) energy transition? This question is based on two assumptions underlying this research i.e. policy makers want to use energy justice to guide the formulation of energy policy and, second, energy justice is instrumental to realise the energy transition. The first assumption has been discussed in the previous section.

The second assumption, however, is based on the fundamental issues of the energy transition; it needs public support to accelerate and consequently, reach the energy targets. The expansion of populistic

right-wing parties in Europe indicates that support for the energy transition is shrinking. Therefore, energy policy should move away from the economic based approach on which energy policy has been developed for decades. The evaluation framework tries to balance to economic approach by also incorporating social and environmental impacts. Moreover, by recognising the misrecognised groups in society and the valuation of a fair procedure, the interests of all stakeholders are included. As a result, policy makers can use the framework to halt the widening of inequalities and coop better with resistant for the energy transition. Not only will this gain more public support for the energy transition but will benefit society as a whole since inequalities, such as income inequality, has been found to hamper society (Wilkinson and Pickett, 2010). Energy justice is thus instrumental in realising the energy transition and therefore, policy makers should use the evaluation framework to govern the transition and to get all voices on board.

6.3 Recommendations

The last part of this study details the first steps towards policy recommendations to promote energy justice and consequently, just energy transitions. The recommendations are based on best practices of the two cases and connected to the evaluation framework and the different dimension of energy justice (See Table 6-1). The recommendations are embedded in literature in order to provide a stronger foundation.

Table 6-1. Overview of the policy recommendations

		Policy recommendations
Evaluation framework	1.	Use energy justice as a tool to design energy policy
Distributive justice	2.	Ensure better distribution of costs and benefits of the energy transition so that citizens also experience the benefits and not only the costs.
Recognition justice	3.	In the mitigation of the social negative impacts of coal phase-out, there should be special attention for low educated worker and older workers.
	4.	Treat challenging opinions with respects.
Procedural justice	5.	Assure a timely and inclusive participation process.

1. Use energy justice as a tool to design energy policy.

This recommendation is worth mentioning as energy justice is barely incorporated in policy making. Therefore, the first step is to acknowledge the concept of energy justice in policy making and to operationalise and monitor it by using energy justice metrics, including this evaluation framework. This recommendation is echoed in the article by Delina and Sovacool (2019). Here the authors state that to speed up the energy transition (or any sustainable transition) a coherent framework is pivotal, and the concept of justice offers a way forward.

2. Ensure better distribution of costs and benefits of the energy transition so that citizens also experience the benefits and not only the costs.

Energy transition costs a lot of money, it is therefore important that each household contributes. However, the vulnerable groups in society should not be paying disproportionally for the energy transition nor should the benefits be only felt by a small group as it will decrease legitimacy of the transition.

In the case of Burgenland, the national and regional governments took sufficient measures to share the costs of the energy transition as all electricity users pay the green electricity surcharge except for vulnerable groups who cannot afford these additional costs. The energy transition also did not increase energy prices, nor did it jeopardise the security of energy supply. Moreover, in Burgenland low-income households receive heat subsidies to make sure all households can heat their homes, especially during winters. Additionally, the benefits of the energy transition are felt in Burgenland as citizens do not only enjoy the consumption of clean energy but also the financial benefits from wind parks as they feed back into the community e.g. by building new soccer fields. In the Engie case, a community fund will be established for which citizens can apply for subsidies to support local projects that benefit the

community. These are examples of how the community can enjoy the benefits of wind energy which increases the positive attitude towards wind energy.

The recommendation of fair distribution of costs and benefits of the energy transition is also embedded in the literature about energy justice. The energy justice principles discussed in the article by Sovacool et al. (2016) include for instance the principle of availability which stipulates that people deserve sufficient energy resources of high quality. Furthermore, it aligns with the second principle of affordability which advocates that all individuals should pay no more than 10% of their income for energy services.

3. In the mitigation of the social negative impacts of coal phase-out, there should be special attention for low educated worker and older workers.

The energy transition will eliminate jobs in the coal sector and other related businesses. If there is no sufficient mechanism to support those previous employed, unemployment rates of the lower educated group and older ages will increase. This may result in greater inequalities (e.g. income) as the new available jobs require higher levels of education and skills attained.

In the case of Engie, best governance practices in increasing distributive justice are found in the social security measures for the affected workers and the supporting programs for new employment. Here, the financial compensation schemes such as the early retirement program was important as it allowed many of the older workers to escape the 'age gap' by enjoying early retirement. Moreover, the work-to-work measures were essential in the transition towards new employment. A mixture of different measures made that all workers, except two, found new employment. For this reason, it is recommended that for each phase out, a mixture of measures is offered to help the workers in their transition to new employment. In addition, these measures should particularly support the vulnerable groups.

This recommendation aligns with the International Labour Organisation's (ILO) Guidelines Principles (2015). These are principles for 'a Just Transition Towards Environmentally Sustainable Economies and Societies for All' and they are recognised and applied in the Paris Agreement. In these principles, special attention is made towards 'Job security for those previous employed' in the energy transition.

4. Treat challenging opinions with respects

Opponents of wind energy are often seen as ignorant and misinformed, which results in governments and energy developers to discard their opinions. However, respectful treatment of opponent's voices is important as the repressing of local protest undermines attempts at open-minded discussion and compromise. It also fails to recognise the sincerity of many concerns.

The Engie case illustrates the best practices in dealing with opponent voices as they treated the opponents' ideas and arguments with respect. The citizens were invited repeatedly for information sessions to inform them about the impacts of two wind turbines of which a trip to a wind energy park was organised. Also, Engie organised several meeting sessions with opponents in order to listen to the

many concerns and engage a dialogue. Furthermore, all the possible measures were taken to reduce nuisance (shade from rotating blades, noises and landscape impact).

This recommendation overlaps with the last energy justice principle of 'Respect' in which it is prescribe that differences in knowledge and epistemic upbringing, culture and experience should be respected in energy decision-making (Sovacool et al., 2016).

5. Assure a timely and inclusive participation process with open and clear communication.

Start the participation process before decisions are taken or wind turbines permits are issued. The Engie case illustrates how acquiring permits without a participation process results in high resistance from local residents.

In Burgenland, this regional zoning planning started before the large expansion of wind parks which made that no stakeholder was unheard or felt left out. As zoning involves many issues, from heritage sites to endangered bird species, the regional wind energy zoning plan turned out to be also the right instrument to include all relevant stakeholders in the decision-making. At higher level all land-use conflicts were solved, which paved the way for the large expansion of wind energy in Burgenland. In addition, for the more local zoning, the wind energy developers had the responsibility to start the dialogue with the citizens to convince them about wind energy. This tradition of dialogue resulted in no wind energy project being shut down by protesting citizens as there is no significant civil engagement against wind energy.

This recommendation aligns with the ILO's Guidelines Principles of 'Social consensus'. This principle stipulates that there should be strong social consensus on the goal and pathways to sustainability. Social consensus can only be achieved if the decision-making process starts as early as possible and is inclusive.

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Annexes

Annex A – List for case study selection

Title	Impacts	Assessment
Closure Longannet (Fife, Scotland)	In 2016, the coal plant was officially closed because it was not economically viable due to high environmental and transmission costs, and the rapidly-increasing competitiveness of renewables. Longannet was Scotland's last coal power plant. The government played an important role in the process, e.g. establishing a taskforce to support the 300 workers in the transition (Coalmap.eu, 2015). But, the coal-fired power station's demise came at a price of 230 direct jobs and an estimated 1,000 indirect jobs and at a cost of £50 million a year to the local economy (Clark, 2017). Restoration was also an issue. However, in 2018, there was already the announcement that all employers have find new employment or are retrained (Clark, 2018). Background info: GDP in that region has fallen from 100 (2005) to 98 (2015). Region has.1.1 pp decreases in employment (SPICe, 2017). The Partnership Action for Continuing Employment (PACE) - the Scottish Government's agency to support people facing redundancy – to ensure that the 470 staff were provided with as much support as possible to enable them to secure new employment.	✓ Available and easily accessible: Minutes on taskforce meetings and government's statement ✓ Lot of attention on the process of new employment. ✓ Availability of Gini on UKM2 Nuts2 ✓ Scientific report on the successful approach of the UK - No party was appointed to restore the sight - Local economy dropped also due to Brexit
'Out of work, into work' by Steag (Voerde, Germany)	Recently, the Government announced the projected 2038 deadline to shut down all coal mines and electricity plants powered by black or brown coal (Reuters, 2019). However, they rely still heavily on hard coal and lignite for its electricity production. The government is developing phase-out subsidies for North Rhine-Westphalia under EU law to retrain younger workers and establish early retirement schemes for others (CanEurope, 2015). When the plant was full running, it employed 550 to 600 workers. It was one of Germany's largest hard coal fired power plants. The company established the employee program 'Out of work, into work' to successfully make the transition (Steag, 2017). The Ruhr has grown into the centre of environmental technology research in Germany. The cluster has created new employment in the region as well: about 100 000 people were working in this branch by the mid2000s. Local firms, universities, research institutes (e.g. the Soil Protection Centre and the Environmental and Packaging R&D Centre) were involved. The Ruhr has developed a comparative advantage in energy supplies and waste disposal. Due to the massive amounts of energy resources	✓ Report on Rurh area in Germany → from coal and steel to knowledge-based region. ✓ Article on Germany's challenge phasing out coal (Bajczuk, 2015) and case studies on North Westphalia (Hartmann, 2008). ✓ Mines in region with 1500 workers (Biesemans and Fitzpatrick, 2018). - To what extent is Steag a good example for this region? Most important, start of restructuring of the region starts in 1968→ so change of 5 decades. Not representative for now.

	needed and waste produced by the coal and steel plants, R&D in the field of renewable resources, recycling and waste combustion was stimulated from a relatively early period on.	
Dardesheim, Germany	The city of Dardesheim realized 4000% renewable power by installing PV installations and wind turbines. The transition has brought added value in the region, jobs (3000), increased tourism and energy security (Go100percent, 2019). Economy before was depressed. Citizens were very involved. Leadership played an important role. (1) the existence of engaged and charismatic pioneers, (2) a high degree of citizen participation, (3) the small size of the city, (4) the 29 cooperative political and administrative environment, (5) Dardesheim's structural weaknesses (6) the good relations with the grid operator, (7) the network with other 100%- RE-regions and (8) the German support scheme for renewable energies. The only major obstacle has been the high price of renewable raw materials which has up until now hindered the establishment of a local district heating system	✓ (Impact Assessment (Go100perecent, 2012) and scientific case study (Beerman, 2009). ✓ Lots of info on policies of the Energiewende. ✓ Project has strong National support - Small community, - is used so much nationwide beacon. - Not very innovative (since 2006, much written on it)
Energy self-sufficient Commune of Kisielice (Kisielice, Poland)	This municipality with 2 200 habitants installed 50 wind turbines with a total capacity of 94,5 MW. As a result, the municipality achieved the target of 100 renewable electricity target in 2014 and won the European Commission's ManagEnergy Award 2014 (European Commission, 2014). Local farmers receive a yearly remuneration for the turbines on their land (100%renewable, 2015). Moreover, electricity is generated by burning cereal straws which are purchased from local farmers. In previous studies, it was stated that the transitions resulted in higher employment (Wasiuta, 2018).	✓ Recipient of the European Commission's ManagEnergy Award 2014 ✓ It is in a region where many coal plants are located - Language barrier for interviews and reading governmental reports
Wind park in (Saint George Sur Arnon, France)	Saint George Sur Arnon is a small municipality consisting of 430 habitants. In 2009, the municipality installed 14 turbines with a total capacity of 35 MW (Akuo Energy, n.d.). The project has several local economic benefits such as tax revenues (around €144 000 per year) and the creation of at least 6 new jobs from the new maintenance center established in the municipality. In addition, the revenues are recycled by for instance the building of a community center (100 RES communities, 2017). Moreover, the local community was involved throughout the whole project (Garcia, 2017).	✓ Case study has been done with interviews: (Garcia, 2017). - Language barrier

Annex B - List of interviewees

Table 0-1. Overview of interviewees for the case of Burgenland

Actor	Name and function
Provincial government	Interviewee 1: Former Governor
	Interviewee 2: Director of Burgenland Energy Agency (BEA), Managing Director of TOB Technology Promotion Burgenland.
IG Windkraft (Wind Energy association)	Interviewee 3: Spokesman of IG Windkraft
Renewable Energy association Austria	Interviewee 4: CEO
OÏR, Austrian Institute for spatial planning	Interviewee 5: Spatial planner
Püspök Group (energy operator)	Interviewee 6: Manager director
National park Neusiedlersee	Interviewee 7: Head of Department for Public Relations & Ecotourism
Total	**7**

Table 0-2. Overview of interviewees for the case of Engie

Actor	Name and function
Provincial government	Interviewee 8: Spatial planning manager
Municipality of Nijmegen	Interviewee 9: Policy advisor of Nijmegen
Over Morgen B.V.	Interviewee 10: Process director
Engie Nederland	Interviewee 11: Former site manager
	Interviewee 12: current site manager
Residents Nijmegen	Interviewee 13: Neighbourhood Waterkwartier
	Interviewee 14: Neighbourhood Waterkwartier
Residents Beuningen	Interviewee 15: Neighbourhood Weurt
	Interviewee:16 Neighbourhood Weurt
(Ex-)workers Engie Nederland	Interviewee 17: Former employee
	Interviewee 18: Current employee
Total	**11**

Annex C – Interview guide

The following questions aimed to guide the interview and were further tailored according to the interviewee's role and expertise in the energy transition. The questions aimed to provide a better understanding regarding the processes, outcomes and impacts of the opening/closing of energy projects.

Introduction

Background info: What was your role/function during the energy transition?

Distributive justice:

1. How do you look back on the energy transition?
2. What were the main drivers of the energy transition?
3. What are according to you the consequences and impacts in terms of justice of the transition?

   Follow-up questions:

   - What were the impacts of the transition regarding employment?
   - To what extent were there any differences across gender or education levels?
   - Where there any income impacts (e.g. for households, the municipality, the regional GDP or (ex-)workers)?
   - What are the impacts in relation to energy, for instance prices, access or self-sufficiency?
   - How did the energy transition impact social cohesion in the region?
   - Can you recall other impacts such as demographics and/or tourisms?
4. What kind of measures were there taken by government or companies to ensure everyone could benefit from the transition/ help the negatively affected?

Procedural justice

5. To what extent was the decision-making process inclusive?
6. To what extent was the local community properly informed and engaged?
   a. How transparent was the information e.g. reports disclosed?
   b. How was/is the representation of the society in your institution?
7. What measures were taken by government or companies to include stakeholders in the process?

Recognition justice

8. How were different opinions and voices treated during the energy transition?
9. To what extent was there special attention for vulnerable citizens (elderly, youth, sick people) and how is this done?

Closing questions:

10. What have you learned from the energy transition?
11. Do you want to add something to the interview that has not been discussed before?
12. Are there any other persons I need to talk with to get a good understanding of the case?
13. For the next interviews, what should be improved to get better answers?

In addition, one question was asked about policy design principles for just energy transitions. However, this question did not lead to useful answers and was decided not to be included in the results.