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# Energy Transition and Revolution in Tunisia: Politics and Spatiality

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*Energy transition in Arab countries is usually addressed as an economic and technological issue. This analysis of Tunisian policies on renewable energy argues that it must be understood from a political and geographical perspective. Energy policy in Tunisia is dominated by STEG, the national utility for electricity and gas, which has held a monopoly since independence and enjoys strong historical legitimacy for its achievements. Beginning the 2000s, however, national energy self-sufficiency was challenged and the government pushed for renewable technologies, which STEG was wary of and whose implementation it has slowed. The Tunisian revolution has strongly shaken the balance of power in the country, allowing for multiple and multi-level criticisms of STEG and for the forging of new alliances for renewable energy projects. Some of these projects are on the verge of implementation. Because they rely on different geographical visions and varied technologies, however, they may in the end prove unevenly successful.*

*Keywords: energy transition, renewable energy, electricity, socio-technical collective, politics, Tunisia, revolution*

*La transition énergétique dans les pays arabes est généralement traitée comme un enjeu économique et technologique. Analysant les politiques énergétiques tunisiennes, en particulier la promotion des énergies renouvelables, nous défendons l'idée que la transition énergétique doit être comprise dans une perspective politique et géographique. La politique énergétique en Tunisie est dominée par la STEG, l'opérateur public en charge de l'électricité et du gaz ; elle détient le monopole depuis l'Indépendance et bénéficie d'une forte légitimité historique pour ses réalisations. Mais depuis les années 2000, la Tunisie n'est plus autosuffisante au plan énergétique et le gouvernement pousse au développement des énergies renouvelables, pour lesquelles la STEG se montrait méfiante en freinant leur mise en place. La révolution tunisienne a fortement ébranlé les rapports de force dans le pays et a suscité de multiples critiques de l'opérateur public à plusieurs échelles, tandis qu'émergent de nouvelles alliances en faveur du développement des énergies renouvelables. Certains projets sont sur le point d'être réalisés, mais comme ils reposent sur une diversité de visions géographiques et de technologies variées, leurs chances de succès pourraient être inégales.*

*Mots clés : transition énergétique, énergie renouvelable, électricité, collectif sociotechnique, politique, Tunisie, révolution*

In several countries of the Arab world, the release of the 2013 World Energy Outlook (OECD and IEA 2013) has been met with concerns about subsidies on energy rates. These subsidies are perceived as the major hindrance to a transition toward modern, and specifically renewable, energy sources. Such views can be criticized, however, as they reduce energy policy to a technology- and economy-driven process that occurs at the national level. It can be argued that energy transition, understood as the move from one energy mix structure to another, depends not only on such national policies led by government but also on the complex interplay of an array of actors with various and often competing interests and agendas. Politics, with its specific temporality,<sup>1</sup> needs to be reintroduced in the analysis of energy transition. In addition, these various and competing actors operate at scales that often cross over the national scale; some actors may rely on specific, place-based local resources or deploy their strategy at a scale wider than the nation. International geopolitics is indeed a core pattern of energy issues. This article explores these issues through a case study of energy transition policies in Tunisia before and after the 2011 revolution.

Tunisia, a middle-income Mediterranean country, is characterized by its dependence on fossil-fuel energy sources, which has continually increased over the past 15 years. This context is a powerful driver for energy transition, and Tunisian authorities have thus naturally expressed a desire for “energy efficiency” via energy-saving measures and the promotion of renewable energy. Yet compared to neighbouring countries, Tunisia has been slow to truly commit to a program to develop renewable energy: in 2011, renewable energy accounted for only about 3 % of its installed capacity (1 % from wind turbines), as opposed to 4 % wind and 26 % hydro in Morocco in 2010 (Bahgat 2013). The Tunisian situation can be described as a largely blocked energy transition, although several recent initiatives do seem to be moving toward unblocking. Our hypothesis is that this blocked transition must be seen as the result not only of inadequate legal and financial tools to allow for the emergence of renewable energy but also of political values and choices. Representations of energy production and distribution as a means of national independence and pride explain why the national energy company has been granted the power to control policy making in this sector. The 2011 revolution, which brought a brutal change in the power balance, challenges this situation and allows for competing private actors, but also unions and local discontents, to openly contest the national company and advance new claims. They propose strategies that articulate differently the technologies and scales of the energy system. In this article we consider the availability of the energy resources that renewable energy is potentially meant to replace (the depletion of hydrocarbon

resources in Tunisia and neighbouring countries) and the layout of the existing or envisaged electrical networks that affect the operating conditions and profitability of renewable energy. In other words, we must carefully analyze the geographical dimensions through which energy transitions occur.

The first section of the article sets out the theoretical framework of the study, specifically how politics and geography articulate with the framework of transition studies. The second section describes the organization of the Tunisian energy sector and its recent moves toward devising an energy transition strategy. The third section analyzes the impact of the Tunisian revolution on the energy sector; the final section presents the geographical dimensions that shape several alternative projects challenging the existing organization.

### **The Spatiality and Politics of Energy Transition**

Over the past few years, our understanding of energy transitions has been substantially enhanced by research that has moved away from analyzing public policy related to energy transition and instead focused more on the role of temporalities that are unique to regimes or niches, particularly by reintroducing representations and agencies into analyses (Geels and Schot 2007). Beyond public policy, it is the social and political interests and the relationships of power between protagonists—in sum, politics—that need to be examined, acknowledging that “there is a politics to transition management” (Shove and Walker 2007, 766). Drawing on examples from the field of energy, several researchers have criticized transition management studies for, among other things, their failure to take into account political dimensions “that the formal mechanisms of transition management are ill equipped to negotiate” (Meadowcroft 2009, 335). Yet analyses still often look essentially at regimes and niches to explain the evolution of socio-technical systems based on the more or less fundamental changes that affect them. Geels and Schot (2007) suggest understanding socio-technical landscapes as an essential variable likely to create disruptive pressure that can alter a regime’s balance and encourage innovation in some niches. But in the literature, the notion of the socio-technical landscape is usually understood in a relatively narrow and limited sense that tends to leave out of the analytical framework certain broader socio-historical characteristics relating to, for example, political upheavals. Landscapes are generally characterized by long-term time spans, though some rapid changes can be caused by disruptive events (Raven, Schot, and Berkhout 2012). Although such changes may not appear directly related to the socio-technical context, the reframing and adjustments they impose do tend to greatly influence transitions. The 2011 revolution in Tunisia can be seen as a disruptive event that had indi-

rect but significant consequences for the energy transition process.

Just as the broader historical and political context must be taken into account, the same is true of the spatiality and territoriality of transitions. The need to seriously consider space and scale dimensions within transition processes has been noted in recent academic work focusing on sustainability transitions (Coenen et al. 2012), socio-technical transitions (Raven et al. 2012), or energy transitions specifically (Bridge et al. 2013). These studies all suggest that in multilevel perspective analysis, geographic approaches are implicit but partial, according predominance to the national scale and emphasizing national differences (Coenen et al. 2012) but without considering the spatiality of transition processes. This study of Tunisian energy policy focuses on the reshaping of the national level, which is being stressed by external and internal pressures. It relies on an approach that assumes that spatial scale is relative and that it is “socially constructed through networks of actors and cut[ting] across territories” (Raven et al. 2012, 70). Gavin Bridge et al. (2013) recently noted six geographical components that help unpack the spatial dimension of energy transitions: location, landscape, territoriality, spatial differentiation, scaling, and spatial embeddedness. These dimensions take on meaning and produce effects in close connection with the political time scales mentioned above; as such, they cannot be separated in analyses.

To test our hypotheses about the blocking and the unblocking of the Tunisian energy transition, we examine the socio-technical *collectives* involved. According to Nadai and Labussière (2011), and in the framework of Actor–Network Theory, we define these collectives as distributed agencies that we can analyze through four basic elements. The first element consists of the actors involved in energy issues and in trying to find solutions. We examine the alliances, connections, and differences between these entities, be they public or private, local, national, or international in scale, and how they evolved over time. This leads to a second element: the visions (unique or shared) that such actors have of the goals they pursue and of the interests they defend. We look more particularly at the scales of reference behind such visions, showing that since the revolution, the emergence of new collectives has brought into play some new geographical considerations that question the prevalent national vision of energy supply. The third element is the technologies at work in energy production and consumption systems, which we address through the different types of renewable energy developed in Tunisia (mainly wind and solar energy). Finally, to understand the conditions under which such technologies are rolled out, we must examine the policy instruments used or envisaged to implement them. These four elements are intrinsically connected and interact with one another; taking their temporality into account allows us to showcase this and to address the spatial and

material configurations that they convey and produce.

This article is based on research undertaken in Tunisia beginning in 2010.<sup>ii</sup> Several field visits and about 30 interviews with administrations, firms, and local NGOs were complemented by an extensive survey of press and administrative documentation. While doing fieldwork and obtaining administrative data beyond the documentation available online was quite difficult, things have become much easier since 2011, particularly with respect to STEG, the national utility. But the political stalemate in Tunisia has not only delayed the implementation of new policy measures but also triggered a lot of speculative investments, which we found useful to investigate, even though they may never be realized.

### **Energy Transition under Centralized Control**

This section analyzes the blocked energy transition toward renewable energy in Tunisia during the 2000s. In the name of a vision of national energy independence, and using electricity supply as a political tool to promote development, the national electricity and gas utility has used its long-standing political clout to control and regulate diversification initiatives. The measures taken in the Tunisian Solar Plan in 2009 illustrate a policy that remained under the state utility's control.

#### *From Self-Sufficiency to Energy Stress: A Chronology of Tunisia's Strategy for Energy Efficiency*

Since 1962, energy policy in Tunisia has been jointly conducted by the government, through its ministry responsible for energy issues, the Ministry of Industry and Technology, and by the Société Tunisienne d'Electricité et de Gaz (STEG, the Tunisian Gas and Electricity Company), the national utility. STEG was created in 1962 with the mandate to produce, transport, and distribute electricity and to transport and distribute natural gas across the country. It has played an influential role in the supply of energy, leading to an electrical distribution rate of 100 % in cities and 98.5 % in rural areas. From the outset, the government conferred on this state-owned utility a strong political mandate that combined two goals: reaching national energy independence in a context of decolonization in a country with fewer energy resources than neighbouring Algeria and Libya; and socio-economic development via electrification of remote or socially deprived areas, using a tariff policy based on large subsidies to certain categories (e.g., working-class neighbourhoods, rural areas).

In terms of energy resources, Tunisia was quite well off until the turn of the millennium thanks to the exploitation of its oil and gas resources. Investment in a distribution network for natural gas was encouraged

starting in the 1980s, with the goal of reducing public spending on imports of oil-based energy commodities.<sup>iii</sup> Moreover, the Tunisian government levies a tax on Algerian natural gas that transits across the country en route to Italy. But pressures on energy supply in the 2000s made it increasingly necessary to promote renewable energy and energy-saving measures. In 2000, the national energy balance tipped from being positive to running a deficit. Local oil resources were running out just as demand was increasing due to demographic growth, rising standards of living, and economic growth. In 2004, the increase in international hydrocarbon prices made the consequences of this deficit a palpable issue in the state's budget,<sup>iv</sup> while increased household equipment levels<sup>v</sup> have boosted power demand to such an extent that meeting middle-of-the-day demand during the summer months has become increasingly difficult, making the "summer peak" a truly alarming issue. These trends have spurred the government to examine how energy diversification could encourage renewable energy solutions.

The first law on energy efficiency, passed in 1985, created what is now called the Agence nationale de maîtrise de l'énergie (ANME, the National Energy Efficiency Agency), under the responsibility of the Ministry of Industry. ANME's mandate is to implement government measures related to renewable energy and energy efficiency. Its concerns diverge totally from STEG's vision and are influenced by the international cooperation organizations with which it has worked, first mainly French and German, then with the European Union with the rise in the 1990s of the Medener network in the context of the Barcelona Process.<sup>vi</sup> Despite this broadening of the actor network in the energy sector, STEG has retained its pre-eminent position. The situation of energy stress after 2004 created momentum for alternative approaches. In 2004, the Tunisian Parliament passed a law on energy efficiency<sup>vii</sup> that introduced a series of measures to encourage reductions in energy consumption (Sahtout 2012). Several measures targeted the construction sector and household equipment: implementation of energy audits for multi-unit buildings, thermal regulations for new buildings with a series of new architectural standards, and attempts to curb energy use through information campaigns and labelling of household equipment and air-conditioning appliances, and promotion of solar water heaters (Benalouache 2013; Bolzon, Rocher, and Verdeil 2014). The goal was also to allow for the production of renewable energy. These measures were accompanied by a whole series of subsidies, tax breaks, and financial incentives financed by the Fonds national de maîtrise de l'énergie (FNME, the National Fund for Energy Efficiency), a fund created in 2005<sup>viii</sup> with the help of international aid (e.g., Agence française pour le développement, World Fund for Environment). They nonetheless had very different results in the different sectors involved. The year 2009 marked a new stage

in the process. Previous measures had produced only limited results, notably in terms of new generating capacity, while the impact of increased hydrocarbon prices was growing. At the same time, international initiatives promoting renewable energy were flourishing, notably the Mediterranean Solar Plan and the Desertec project (Moisseron 2010). The Tunisian government then launched a new strategy that resulted in the adoption of the Tunisian Solar Plan (TSP), the Tunisian version of the Mediterranean Solar Plan, following two presidential energy-saving campaigns (2005–7 and 2008–11). The implementation of the policies and projects outlined in the TSP was overseen by a new law on energy efficiency,<sup>ix</sup> followed by a series of decrees.

*The Tunisian Solar Plan: The Reaffirmation of State-Dominated Steering of the Energy Transition*

Tunisian authorities' desire to encourage the development of renewable energy was particularly visible in the TSP, published in September 2009. This plan—which is misnamed, since solar energy is actually not its sole focus—is more of a roadmap to 2030 in favour of energy efficiency and different types of renewable energy, notably wind power, solar energy, cogeneration, and biomass. The document lists 40 potential projects with the goal of reaching a capacity of 4.7 GW by 2030 through the involvement of both public and private sectors. However, the institutional and financial means made available for this plan fell short and have resulted in only two initiatives. The first is a law that encourages self-production (i.e., production to meet internal needs) by industry actors. We will return to this point in more detail in the second section, but it is worth noting that by limiting itself to self-production, the TSP fell short of its stated goals for developing solar and wind power projects. The second is the creation of a specialized subsidiary of STEG—STEG Renewable Energy (STEG-ER)—responsible for researching sites and implementing projects as well as for managing renewable electricity power plants. STEG-ER was immediately commissioned to manage the Sidi Daoud wind power plant in Cap Bon (54 MW) and several studies by private investors interested in renewable electricity projects.

The TSP's limited outcomes are evidence that the state operator has maintained its historical stranglehold over the definition and implementation of Tunisian energy policy. In the early 2000s, international donor agencies, notably the World Bank, challenged STEG's monopoly and recommended a partial privatization of Tunisia's electrical sector (World Bank 2004). A combined cycle plant was built and opened by a private American–Japanese firm, and the government held discussions with potential investors with a view to authorizing production in privately managed wind power plants. But under a new manager, STEG repudi-

ated this orientation and turned its back on the private sector. The drafting of the 2009 strategy embodies STEG's logic of resistance to the various forms of pressure weighing on it in order to help maintain control over the sector. The strategy was wholly elaborated by the CEO of STEG and the director general of ANME, who was later appointed CEO of STEG-ER in 2010—and who happened to be a close friend of the Ben Ali family.<sup>x</sup> Senior management at ANME was not consulted on this decision, however. STEG-ER, a private subsidiary, is majority controlled by STEG, which intends to use it as a tool to branch into renewable energy. In such a patronage-based economy, it is quite likely that the control of a market like this provided under-the-table commissions for people close to the regime. Several such scandals have been revealed recently involving STEG-managed deals. This episode clearly shows the weight of interests and politics rather than a transition consensually piloted by a government that truly wants to equip itself with the best possible tools. The result is that the energy transition was stalled, since nothing (and, in particular, no private-sector projects) had been undertaken, aside from the modest STEG projects.

### **Towards an Energy Revolution?**

The Tunisian revolution of January 2011 was a turning point that shook up the existing collectives and challenged power relations, notably the pre-eminent position held by the STEG–STEG-ER collective. These transformations opened windows of opportunity for dissenting actors who, in the name of visions previously marginalized, demanded that balance be reset in Tunisian energy policy and suggested tweaking the existing instruments or finding new solutions. In this section, we first highlight how the socio-technical collective acting in the name of the state monopoly was weakened, then examine the emergence and empowerment of an alternative collective focused more particularly on wind power and/or photovoltaic technology, conceived on a national scale. Finally, we look at a third type of collectives that is part of a broader scale (the Maghreb and Euro-Mediterranean) focused on solar technologies (large photovoltaic power plants and/or concentrated solar plants [CSPs]).

#### *The Weakening of the State Monopoly*

The Tunisian revolution was a political event whose starting point had no direct connection to the country's energy situation. In the Tunisian context, at least, most analysts do not draw a direct connection between the revolution and the energy situation, pointing instead to a combination of social and regional inequalities resulting from a neo-liberal devel-

opment mindset marked by state withdrawal and the exacerbation of predation for the benefit of those close to the ruling family (Ayeb 2011). The revolution has nonetheless had major consequences for the energy sector, thanks to the intersection of several causes.

Firstly, social protest focused on living conditions and, in particular, on essential services. Part of the population stopped paying their electricity bills in the months following the revolution: in April 2011, estimates in the press (which were confirmed in our interviews) were that roughly one-third of customers were not paying their bills. Despite various attempts to recover these sums by toning down the usual repressive measures (e.g., fines, cutting off customers who fail to pay), the number of unpaid bills continued to increase, and by 2013 amounts owing had reached TND530 million (vs. TND160 million in 2010).<sup>xi</sup> The non-payment of bills expressed, on the one hand, a critique of the electricity collection system, and especially of the television tax, which is based on customers' electricity bills; and, on the other hand, a belief that electricity and gas were too expensive, just as demand was increasing greatly (Bennasr and Verdeil 2014). The population's sensitivity to energy prices has pushed the government to greatly limit increases to the cost of energy, even though subsidies to the energy sector in 2013 represent 10 % of the national budget and are fuelling an increasing deficit. September 2012 saw the first increase since July 2010, amounting to 2 % for individual users and 8 % for industrial and business users. Between unpaid bills and the increasing cost of subsidies, STEG was financially weakened, which affected its ability to invest. It thus became difficult for STEG to initiate new projects, notably those involving renewable energy, although it currently claims to want to.

In addition to its financial problems, STEG has experienced internal dissent of unprecedented proportions, led by the electricity union. Unionism is very strong in Tunisia and was never totally subjugated to the Ben Ali regime (Yousfi 2013). The electricity union has rallied efficiently in recent years against projects related to the sub-contracting of distribution; it was at the forefront in decrying problems at the privately operated Ghannouch combined power plant, which has been in operation since 2000. The union is very critical of renewable electricity generation projects proposed by independent investors and criticized the creation of STEG-ER as a foreshadowing of STEG's privatization. Further, a victorious strike against sub-contracting the management of the Sidi Daoud power plant in Haouaria to STEG-ER beginning in 2010 resulted in the cancellation of the initiative (STEG-ER's first) and called into question a similar initiative planned at the Bizerte power plant. This struck a strong blow at the STEG-STEG-ER collective, which was formed, according to the TSP, to promote the development of capacity from renewable sources. Most employees seconded to STEG-ER

returned to the parent company, and by mid-2013 the subsidiary, which is unsure of its future, was nothing more than a design office with about 20 employees, mostly mid- and high-ranking executives.

In addition to these sources of structural and internal weakness, the increased freedom of speech enabled disagreement and demands to be publicly voiced through press releases and public demonstrations. Likewise, within the government, caution has given way to open and outright criticism, and the people we interviewed were also much clearer in expressing their dissatisfaction with the state monopoly. One example is the emergence of unprecedented opposition to STEG's construction of a wind farm (total size 190 MW) on two sites in the Bizerte region, Metline-El Alia and Jabal Kchabta. The project was launched in 2010; by 2011, it had begun attracting various forms of opposition from villagers over disturbances caused by the related construction work (notably roads) and the lack of economic outcomes, jobs, and local development. The failure to consult with the population about this decision before and during the process fuelled criticism. Some facilities were sabotaged, causing a lot of damage and a halt in production that lasted for more than six months (Verdeil 2013). Some demands, notably those related to jobs, are typical of the types of protest seen during the revolution (Hibou 2011); more broadly, this opposition voices a critique of centralized development as embodied and defended by STEG. A January 2012 press release following an information meeting aimed at citizens is telling: it advances points of general interest, such as the provision of electricity across the country—from which local citizens also benefit—and then justifies the refusal to grant them the preferential rates they demand with arguments about the equality of all users. This line of thinking is an example of the failure to specifically take into account the local level in development and programming of energy transition—a failure that is surely not unique to the technologies of energy transition.<sup>xiii</sup> Yet the very existence of this information meeting attests to a radical change tied to the revolutionary context. This localized objection to STEG is only an echo from a larger chorus of criticism of STEG's monopoly and its inability to efficiently lead the energy transition, and it goes along with calls for a change in the regulatory framework in view of authorizing private investment in renewable energy.

### *STEG: The Target of Converging Criticism*

Criticism of STEG, as gathered from several interviews and synthesized in this section, is built around three pillars. The first criticizes a company that is quite resistant to technological innovation and shows an overall preference for proven thermal technologies despite their elevated costs

(costs hidden in part by indirect subsidies). One allegation is that STEG has not fully mastered new renewable energy technologies, and thus has trouble assessing their profitability; another is that it overestimates the inconveniences of connecting them to the grid (e.g., the issue of intermittent generation). Hence, it is alleged that STEG underestimates the potential amount of renewable energy that could be connected to the grid. Moreover, the lack of flexibility in its procedures is said to affect the efficiency of system maintenance (e.g., through long delays in purchasing replacement parts or choosing manufacturers from whom parts are notoriously difficult to track). Some of this criticism—from the ANME as well as certain industry actors and observers—has been corroborated by the Tunisian Court of Auditors (Cour des comptes 2011). It should be noted that STEG has addressed such critiques by underscoring its desire to experiment with pilot projects to learn how to master new technologies and understand their parameters with a view toward achieving national self-sufficiency.

The second pillar of criticism is more ideological and involves acknowledging the end of STEG's historical role in distributing Tunisia's electricity, observing that times have changed and that energy independence—and, in particular, diversification into renewable energy—can be managed by private operators. This critique also focuses on STEG's claim to be—and actual role as—both judge and defendant, that is, its ability to influence the ministry in charge of energy (theoretically the regulator) and, in doing so, actually defend its own interests and vision (e.g., regarding the planning of the power system). This type of critique is notably advanced by senior ANME managers. Talks underway about the appointment of an independent regulator are proof that the lines are capable of shifting with respect to the redistribution of regulating power.

The third pillar is more political in these revolutionary times and highlights STEG's collusion—or, at least, that of some senior managers—with the Ben Ali regime. Among several cases revealed in the press is that of Enerciel, a firm involved in wind power, which has been in a lawsuit against STEG since 2006 over an agreement for the running of a wind farm near Bizerte, signed in 2003 and then cancelled as a result, according to Enerciel's CEO, of Ben Ali's family intervention. This open critique—although nuanced slightly by different actors—is a common basis for calls for shared regulatory instruments in order to move into a new phase of energy transition.

*Forging an Alliance for Energy Transition: Toward a New Law*

The counterpoint to the decline of the socio-technical collective formed by STEG and its subsidiary has been the expansion and growth of new

collectives focused on promoting wind power and centralized photovoltaic systems. These groups are composed of several types of actors, whose approaches and interests initially converged in their criticism of the existing regulatory and institutional framework but who diverge in their practices depending on the technology they promote.

The main institutional actor is ANME, which is officially in charge of Tunisia's energy strategy and of elaborating the TSP. In the post-revolutionary context, its new director general has publicly acknowledged the failures and shortcomings of the strategy launched in 2010 and said that ANME needs to play a leading role in elaborating new goals (Mahroug 2012). ANME is supported in its approach by GIZ, a German international cooperation agency that has provided a dozen experts in charge of prospective studies on the energy mix, the solar plan and strategy, jobs, and so on. More specifically, in June 2011, GIZ helped organize a seminar on self-production from renewable sources, which was important in crystallizing criticism of the regulatory framework and in condemning STEG's attitude toward private investors in the renewable energy sector (GIZ and ANME 2011). German cooperation in Tunisia was significantly reinforced in the late 2000s as part of a policy to promote the export of specialized industries in the energy sector (in which German firms are known to excel).

Another series of actors is composed of several industry representatives. Cement manufacturers, large industrial companies (Groupe chimique tunisien), and oil producers form a first subgroup that consists of representatives from the public and private sector interested in producing their own electricity and reselling the surplus to STEG. A second subgroup consists of firms specializing in renewable energy, notably wind power and photovoltaic systems, that would like to get involved in the renewable energy production market, either as subcontractors of the first group or as independent producers. In addition to this group of economic actors, there are a few associations such as the Association tunisienne pour l'énergie éolienne (Tunisian wind power association). This diverse group of actors is united in its criticism of the law of 2009 (which encourages self-production from renewable energy sources) and its by-laws, which they see as providing insufficient incentive to truly encourage self-production—indeed, no such project has ever materialized. The problematic features for industry actors and their institutional counterparts are the maximum resale threshold of 30 % for surplus electricity, which is deemed too restrictive, and the unsubsidized buyback price, which does not allow attractive remuneration for energy from renewable sources. Because launching a self-production project is too difficult and not rewarding enough for firms that have not mastered the technology themselves, they push for renewable energy firms be authorized to produce and resell electricity.

Public acknowledgement of this problem has led to lobbying for a review of the law and for the adoption of a broader law authorizing the production of privately owned renewable energy through more encouraging feed-in tariffs and the possibility of competitive bidding for projects that exceed a certain capacity (preliminary talk about the new law, initially expected in the fall of 2013, mentioned 10 MW for photovoltaic power and 30 MW for wind power). The drafting and approval of this new law were still underway as of December 2013, but the new prime minister (formerly the industry minister) is supporting the move.

### **Technologies and Geographical Visions of the New Energy Transition Collectives**

This final section highlights the diversity of the existing socio-technical collectives beyond their common lobbying for a new regulatory framework. We analyze this diversity based on the collectives' preferred technologies, geographical visions, and territorial strategies, from the local to the transnational level (see Table 1).

#### *Enerciel and the Creation of a Local Socio-technical Collective*

Thanks to the drop in production costs for wind-powered electricity, a large number of projects are planned in this sector, either via self-production or direct production, although all are conditional on the approval of a new regulatory framework. Enerciel Tunisia is a subsidiary of the American UPC group, which specializes in wind power and is already well established in Italy and Morocco. Their preparations for the introduction of competition provide an interesting illustration of how a potential energy transition is being constructed in connection with the needs of Tunisian firms and in a manner that is attentive to local conditions. Enerciel Tunisia has been surveying the market since the late 1990s and is interested mainly in forging partnerships with (industrial) firms seeking renewable electricity solutions with long-term supply agreements, as it has already done in Morocco. Despite its disappointment regarding the hopes for setting up on the Tunisian market in 2003, it has not stopped scouting for sites with strong wind potential. The originality of Enerciel's approach is the creation of what we can call local socio-technical collectives. This involves knowing and fully mastering the wind-power potential of its sites, thanks to the installation of wind masts, and securing the support of the local population by recruiting site security guards and maintaining ongoing social relationships based on knowledge of and respect for the population (e.g., by participating in family events such as funerals or weddings). We were not able to check these claims in the field, but we can underscore how this approach differs from the way STEG

TABLE 1  
Three Tunisian collectives pushing for renewable energies since 2011

	Enerciel Tunisia	Desertec Ind Initiative	TuNur
Actors	Small branch of an American firm led by a Tunisian entrepreneur	A consortium of transnational energy firms	Consortium of an English firm I (Nur Energy Ltd) + Tunisian partners
Vision, objective, interests, scale	Wind power for the local market	To produce 90 % of EUMENA electricity Power in 2050 (1 GW)	2 GW CSP in South Tunisia for the European market
Technology	Wind farms	Wind farms + PV + CPS transported on the Tunisian grid + HVDC Line to Sicily	CSP (to meet the evening European peak) + special transportation line + HVDC line to Rome
Political, legal, and financial instruments	Revamped Tunisian Energy Law (feed-in tariff + up to 30 MW free access to the market)	Euro-Mediterranean geopolitics	Intensive lobbying of government institutions + local scale (citizens + governor)
	Long-term sales agreements with industrial Tunisian customers	Global finance	Specific tailored law
		Liberalization of the Tunisian electricity market	European investors

conducted its project in Bizerte, discussed above.

The two next examples both highlight strategies aimed at developing renewable (mainly solar) energy from deserts for the European market (Cameron 2013), but the two private firms favour different technological, geographical, and political assemblages.

*Dii in Tunisia: Europe and Globalization, from a Catalyst to a Hindrance to Energy Transition*

Dii (Desertec Industry Initiative) is a consortium of industry actors founded in 2009 to take advantage of the Sahara's solar potential and opportunities to export to Europe. Dii's 2050 strategy is based on studies showing that constructing a power system that connects the north and south shores of the Mediterranean, combined with renewable energy-generating capacities on the south shore, could meet 90 % of the needs of this geographical area by that date for a rate 20–30 % below current rates

(Desertec Industrial Initiative [Dii] 2012). A few years after its launch, however, not much progress has been made. Several of its founding shareholders—notably the German firms Siemens and Bosch—have withdrawn, and open differences of opinion have appeared between the Desertec Foundation and Dii (Calderbank 2013). Reduced growth in Europe, contradictions in the European Union's energy strategy, and conflicting interests between the states of the Maghreb and Spain, which has an excess of renewable sources of electricity, have slowed if not undermined the initially grandiose perspectives behind the consortium's creation. While it is not our intention here to assess this initiative, focusing on the consortium's strategy in the Tunisian context highlights some of the obstacles it has faced.

Dii Tunisia was extremely supportive of the TSP framework proposed in 2010 and signed a statement of agreement with STEG-ER. In 2011, based on a study that used data provided by STEG, Dii Tunisia proposed a plan to the government for the construction of 1 GW of renewable electricity. This plan included the construction of 40 production units, of which two were CSP plants of 200 MW and 220 MW respectively and the remainder were wind-power and photovoltaic units ranging in size from 10 to 30 MW. The electricity produced was destined primarily for export but was also meant to meet local demand on a basis still to be defined. The plan was rejected by both STEG and the Tunisian government. Not only was the existing legal framework inadequate, the project's intention to export also required major regulatory changes to the framework for electricity buyback to line up with the liberalized European market—which in the long run would have required ending both electricity subsidies and STEG's monopoly. Given the current situation, all of this was deemed inopportune and impossible by a former STEG CEO (Eurogroup Consulting 2012), notably because of the issue of true pricing. More concretely, STEG also justified its refusal by underscoring the network's insufficient capacity, which it claimed was limited to 244 MW whereas the geographical distribution of Dii's chosen setup would have allowed for the integration of 1 GW. Indeed, according to the plan, the proposed new units were located mostly in the centre of Tunisia, on high plateaus with strong wind-power potential. Another attempt with a less ambitious scope was rejected in 2012. According to a representative from Dii Tunisia, this rejection showcased STEG's reluctance to experiment in a period of major energy stress, indicating that STEG preferred to continue with familiar technology even if it was more costly. For Dii, the local integration of these production units was a minor issue, since the chosen sites—mostly in the south for the photovoltaic plants—were publicly owned (station transformers) or part of oil leases that actually needed new electric capacity. Thus the main obstacle, according to Dii, was not at the local level but, rather, the increased cost of credit terms

in a country whose revolutionary context was preoccupying international financial institutions and whose credit ratings were negatively affected as a result. Dii's analysis of the setbacks to energy transition, like that of other actors, points to STEG's and the government's outdated and incorrect visions as well as to a poor fit with international conditions that were initially thought to be drivers of energy transition but are now seen as major obstacles instead.

*TuNur: Between Local Lobbying and Trans-Tunisian Perspectives*

Launched by the British Nur Energy firm in association with two Tunisian partners already involved in the energy sector, the TuNur project<sup>xiii</sup> is interesting for its similarities to and differences from the Dii case. The project involves constructing 2 GW in several phases of CSP in southern Tunisia by 2020, mostly destined for export. The TuNur project has the Desertec Foundation label but has no economic or financial ties with Dii, which is actually more a competitor. This initiative has been the focus of major media marketing in Tunisia, underscoring the potential number of jobs it would create—estimated at 22 000, roughly 2 000 permanent jobs on site and the rest related to the construction and creation of a solar sector in Tunisia. The TuNur strategy has involved lobbying at the national level for instruments that would make the project compatible with national regulations, mobilizing locally on the planned site, and highlighting the advantages of its integration at the European level.

At the national level, in addition to its media campaign, TuNur has met with state and government representatives, including the president of the republic and the president of the Constitutional Council. Moreover, TuNur has successfully lobbied to have measures allowing export abroad (to Europe) without use of STEG's network included in the law currently in preparation, thus circumventing STEG and, in particular, its arguments about the network's limited capacity. Further, seizing on the political context and, more specifically, the need to address popular demand for regional development and jobs, TuNur has managed to convince the Tunisian government to place the project in the portfolio of the commission on large-scale infrastructure projects created by decree in January 2013. It is currently under examination pending approval.

At the local level, TuNur has conducted detailed studies on the chosen site in the Kébili region and is attempting to address and overcome the common objections to CSP technology—specifically, the issue of water consumption for cooling steam in the turbines, which could represent a serious problem at a desert site. The choice of tower technology should allow for atmospheric cooling, and the panels would be washed using wastewater from the region's palm groves. Tunur has also

lobbied local authorities, notably the governor, to defend the project to the government, in a region that has been hit particularly hard by unemployment. Finally, through an advertising campaign aimed at citizens—the potential beneficiaries of the promised jobs—TuNur has also built up strong local expectations, which have been reported in the Tunisian press (“Le mégaprojet” 2012; “Kébili” 2013; TAP 2012).

At the European level, TuNur has stressed two advantages of its project. The first is related to the nature of CSP technology, which can produce solar energy in phase with peaks in European demand (in the evenings, even after the sun has set). Second, TuNur has chosen a connection point to the European grid near Rome, avoiding the heel of the Italian boot and its undersized network. A study by British researchers, financed by TuNur, has underscored these advantages (Strbac, Pudjianto, and Hewicker 2012).

TuNur’s multi-level strategy has not eliminated all uncertainty, as some observers have pointed out; in particular, uncertainty remains about the necessary funding and the ability to secure land in the target zone and for the passage of high-voltage power lines. Nevertheless, it is worth underscoring the work done on geographical specificities at the different levels and the ability to seize opportunities in a political context, which is also unique.

All three of the examples discussed in this section illustrate that beyond regulatory challenges, the concretization of energy transition must involve new practices and new alliances that articulate specific actors and technologies in different locations and milieus, as well as between places (electricity buyers are located in places other than where the energy is produced).

### **Conclusion: Energy Transition Entangled in Political Revolution**

Current debates on energy transition in Tunisia focus on the major trends in the energy mix and, in particular, on the proportion of energy needs that renewable energy sources should fill. Given the existing setbacks to this necessary diversification, discussion has focused mostly on the legal and financial instruments that would enable the private sector to participate in the necessary investment. While such focus on instruments—or “regimes,” to employ the vocabulary used in transition management studies—is necessary, our research shows that other factors are just as important. The present study has produced three important results.

The first is the decisive influence of changes in the socio-technical landscape, here notably prices on global hydrocarbon markets and the Tunisian revolution. The move from self-sufficiency to energy stress has marked a turning point and has proved a deeply destabilizing factor in the previously unequivocal national policy of a state that has always

entrusted an operator under its authority with a mission to supply energy, conceived of as a guarantor of national unity. The state has been forced to acknowledge geopolitical tension related to relations with neighbouring states and to accept the consequences of changes in prices set by global markets. The Tunisian revolution, although not directly related to the energy situation, has created a shake-up in established political hierarchies and legitimated new forms of protest and open criticism such that the thinking behind and contextual legitimacy of Tunisian energy policy (and of the STEG monopoly more specifically) have been challenged, and has in turn given free rein to alternative and competing visions and interests. These two events clearly correspond with Geels and Schot's (2007, 403) definition, which sees socio-technical landscapes as exogenous contexts that "do not determine, but provide deep-structural 'gradients of force' that make some actions easier than others"—these, according to Van Driel and Schot (2005), include "rapid external shocks, such as wars or fluctuations in the price of oil" (qtd. in Geels and Schot 2007). While the sensitivity of energy transitions to external shocks is not unknown, it is rarely taken into account in most analyses, despite introducing a very high degree of uncertainty and helping to turn such transition processes into moments of protest and potentially chaotic change, depending on the extent of challenge in the political arena.

The second lesson from this study is that energy transition indeed touches on the highly political nature (as opposed to the technical, legal, or financial dimension) of the positions held by the different actors. Quite clearly, the socio-economic interests of actors play an important role; examples include the STEG union's rejection of privatization, which is seen as putting the company at risk; and the desire of private investors to introduce competition. More generally, access to energy has strong political meaning in Tunisia, where it is bound up with pride in national self-sufficiency, national integration, and access to a form of material modernity. For STEG, which has played a major role in this story, resistance to current critiques makes more sense in the context of this imagined political reality. Conversely, actors who contest the STEG monopoly embrace other global visions, for example, those based on ecology. Because they are unable to impose their visions, however, they have tried to focus the debate on issues surrounding the cost of transition by emphasizing the declining cost of renewable solutions against rising subsidies.

Third, our research shows that energy transitions cannot be understood without examining their geographical and territorial components. The analytical framework provided by Bridge et al. (2013) allows us to highlight the extent to which the dominant geographical dimensions have changed in the Tunisian context. The vision held by the state and STEG is based on the prevalence of a territoriality of national scope, which is

embodied by very strong centralization built over the long term. As this collective has weakened, arguments in defence of a single public operator have shifted toward arguments about social tariffs as a means to ensure that citizens' needs are taken into account, another way of presenting itself as the herald of national unity. The new collectives that we have identified embody visions that highlight new geographical considerations. In terms of scaling, some promoters of renewable-source electrical power plants have challenged the dominant national scale by attempting to introduce production destined for export from Tunisia (in the form of large-capacity units whose location is determined by solar resources), whereas others want access to the grid (in the form of smaller units whose location is determined by the necessary resource—wind or sun). STEG then uses technical arguments about the grid's geographically uneven capacity to defend its monopoly position. The size of renewable energy units, their locations, and the distribution network as such form three inseparable elements at the root of justifications advanced by all parties in the current controversy. Finally, local protests against new units, as well as the attention paid by potential investors to the socio-economic conditions of units' implantation, are proof that the Tunisian revolution has ramped up considerations about spatial differentiation and uneven development. Indeed, according to Bridge et al. (2013, 337), energy transition is “not limited to energy systems themselves, but extends to their patterns of economic growth and development.”

## Notes

- 1 The term *temporality* refers to humans' perception of and the social organization of time. Hence the specific temporality of politics is defined by its non-linear nature, its particular time scales and rhythms, some of which are unpredictable.
2. Our research is funded by a grant from the French Agence nationale de la recherche for the project COLLENER (Sociotechnical Collectives and the Energy Transition) (2012–15), directed by A. Nadaï et O. Labussière. A first version was presented at the 2013 meeting of the Royal Geographical Society, held in London on 26–28 August 2013, as part of a session titled “Emerging Socio-technical Collectives and New Geographies of the Energy Transition,” which they convened. We thank them and other researchers from the team for their constructive remarks on this research, as well as our Tunisian counterparts and informants for their availability.
- 3 The share of natural gas in primary energy consumption went from 26 % in 1990 to 54 % in 2011, and from 9 % to 19 % of final energy consumption in the same period.
- 4 In 2007, the Tunisian state allocated 12 % of its budget to importing energy commodities: crude oil, residual fuel oil, and liquefied petroleum gas.
- 5 Since 1984, STEG has assessed household energy consumption every five

- years. These assessments show an explosion in the number of refrigeration devices (40 % of electricity consumption in 2004) and air-conditioning devices (total number of units increased fourfold between 1999 and 2004) (L'énergie, No. 75, 07/2009).
- 6 The Medener network is an international association of Mediterranean energy agencies that fosters the exchange of best practices in the field of energy. The Barcelona process was launched in 1995 by the EU and Mediterranean partners as a framework for managing bilateral and regional relations.
  - 7 Law #2004-72 of 2 August 2004 on energy efficiency.
  - 8 Law #2005-82 of 15 August 2005 created the FNME, which is financed by a tax on the licensing of new vehicles and air-conditioning devices.
  - 9 Law #2009-7 of 9 February 2009, which modified and expanded on Law #2004-72 of 2 August 2004 on energy efficiency.
  - 10 According to an ANME employee interviewed in Tunis in December 2012.
  - 11 According to STEG's press releases, quoted in Tunisian online newspapers.
  - 12 In 2011, Tunisia experienced a fuel-supply shortage because of the impact of the crisis in Libya on the country's southern region, as well as several labour strikes and citizens blocking access to drilling platforms ("Impact" 2011).
  - 13 *TuNur* is a play on words: *Tu* refers to Tunisia (*Tunis* in Arabic), and *Nur* means light.

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Cadène, Philippe and Dumortier, Brigitte, *Atlas des pays du Golfe*. Paris: Presses universitaires Paris-Sorbonne, 2011.

Certainly the most complete publication of its type available in French, the *Atlas des pays du Golfe* is a perfect complement to the now dated *Géographie universelle*, the well-known French 1990s classic in geography. The atlas is written by two geographers: Brigitte Dumortier, lecturer at the Université Paris-Sorbonne and head of the Department of Geography and Urban Planning at Sorbonne–Abou Dhabi University, and Philippe Cadène, geography professor at the Université Paris-Diderot. The authors are already familiar with the geographical description of the region: Dumortier published a *Géographie de l'Orient arabe* in 1997 and an *Atlas des religions* in 2002.

In five thematic chapters, this atlas offers a geographical overview of the Gulf, described as a “*méditerranée au sens braudélien.*” (p.7). It then concentrates on the challenges posed by the management of local energy resources and proceeds to map contemporary urban, economic, and social changes in the region. A chapter is devoted to the study of states or parts of states located within 100 km of the coast. The final chapter focuses on the region’s important cities, including Dubai, Basra, Dammam, Doha, Abu Dhabi, and Bandar Abbas.

In their introduction, the authors explain their reasons for producing an atlas on the Gulf. Their project is clear from the outset, exemplified by the first map: its aim is not to produce a synthesis of what is already available on the subject but, rather, to fill a gap in French cartographic works on the area. Apart from the *Atlas historique du golfe persique du XVI<sup>e</sup> au XVIII<sup>e</sup> siècles*, no academic atlas is devoted to this region. Dumortier and Cadène’s book is a novelty in that it treats the Gulf separately and is devoted entirely to the region.

As expected, the main physical features of the Gulf are described, followed by the history of this space where the Persian and Arab spheres meet. It is considered a “crossroads of civilizations,” although, except for the Batinah region of Oman, it was always on the fringes of the major empires; the Gulf became important only with the advent of the colonial empires in the East Indies and their related conflicts. The authors then focus on the strategic importance of the Gulf, which contains more than 50 % of the world’s oil and 40 % of global natural gas reserves. Based on official documents, they provide a detailed description of the region’s energy challenges and its refining and transportation infrastructures. They also discuss finding an alternative route to the Straits of Hormuz in case they become inaccessible under conditions of war. These challenges are so important that the region is subject to political and military instability: three Gulf wars, territorial tensions between Iran and the United

Arab Emirates, and sectarian problems between much diversified religious and ethnic groups.

But Dumortier and Cadène have chosen to emphasize the rapid and deep transformations currently underway in the Gulf region, including examples of the expected themes—urbanization, migrations, the importance of free zones, facilities offered to financial and real-estate investors, and so on. They also focus on some lesser-known topics, such as the reinforcement of heritage tourism (highlighted by a rapid growth in the number of tourists to the region), the setting up of an important industrial sector (metallurgy, aluminum, cement, and chemicals), and the opening of numerous branches of foreign universities and local cultural and artistic centres. Dumortier helpfully describes the emergence of this new cultural economy using the example of the Sadiyaat cultural district of Abu Dhabi and a chronology of the education system in Dubai.

Using the same framework, the atlas presents the eight states bordering the Gulf, outlining their political history, the establishment of their contemporary political institutions, the diversification of local economies, the strengthening of natural and cultural heritage tourism, and the particular demographic aspects of their societies. For example, the study of Saudi Arabia shows the significant asymmetry in population density and its relation to the country's history and economic geography; the authors also explain the territorial fragmentation of the seven Arab Emirates that constitute the eponymous state and whose complex territorial formations were subject to the tribal considerations of the 19th and 20th centuries.

The urban aspects of the Gulf coast are thoroughly approached. While Dubai is the region's best-known city, other important urban centres are well described: Kuwait, Doha, Abu Dhabi, and Muscat, but also Bandar Abbas and even Abadan, among others. City master plans are illustrated and explained, though without questioning their feasibility or their current situations. However, evaluations of five of these large-scale projects are lacking; for instance, the Masdar Eco-city project, located near Abu Dhabi International Airport, is currently on hold, as is Abu Dhabi's 2030 development plan, whose public transport networks plans are being reconsidered.

The atlas contains more than 120 maps, which are mainly quantitative and drawn using official data, as well as 10 figures, 10 tables, and a dozen diagrams. It is summed up by a synthetic diagram showing the "*système mégalopolitain littoral en émergence*," which captures the main urban centres but somehow omits Teheran, a city as important as Riyadh in Gulf affairs, while referring to it as "*capitale d'un État considéré comme ennemi*" in the accompanying text (p.113). The last chapter concludes with what seem to be the results of the CITADAIN research program,

although this program is not explicitly mentioned in the text.<sup>1</sup>

The *Atlas des pays du Golfe* is certainly the best publication on the Gulf region currently available for scholars, students, and the general public, bringing together the latest data on the human, urban, geography of the region; it should be compulsory reading for anyone interested in both shores of the Gulf.

#### Note

1. The Citadain program studies the process of emerging metropolitan regions. It aims to improve the definition of such phenomenon and analyses the legal, political and various parameters in deciding the metropolitan region. The program compares Middle East and Indian worlds to arrive at a meaningful and workable concepts and methods.

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# Instructions for Authors

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References should be indicated in the text by the surname of the author(s) with the year of publication, as shown below. References to more than one publication by the same author in the same year should be distinguished alphabetically with a, b, c, etc. The abbreviated author and the date references should be placed in parentheses unless the name forms part of the text, in which case, only the year should appear in parentheses. The relevant page(s) may be given if necessary. Examples:

(McColl 1995a); (Dewar and Watson 1990, 12–13); As Rana (1994, 17) remarks,...

At the end of the main text, the references should be listed in alphabetical order by author’s last name and in ascending chronological order for each author. Only cited references should be listed. Full reference details should be given, including all authors, titles, publisher, and city of publication. For unpublished material, details of availability should be supplied. Examples of references are given below. Authors should follow this format in the preparation of their typescripts.

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