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In this Issue

Editors' Note	1
Contesting Resources: Rent Seeking and Conflict in a small-town Labor Market in Sindh <i>Rashid Memon</i>	2
Who is responsible? <i>Reebana Raza and Anjum Nasim</i>	13
Overcoming Fragmented Governance: The Case of Energy Sector in Pakistan <i>Vaqar Ahmed</i>	16
Revealing Facts: Energy Crisis and Renewable Energy Sources	25

Editors' Note

The dimensions of Pakistan's energy crisis extend from the impact on the economy to the political arena. While the on-going shortfall in energy production has hit both ordinary consumer and industry especially hard, the current government's extensive plan on how to combat the crisis helped the party garner votes during the latest elections.

The National Energy Policy 2013-18, previously referred to as 'Roshan Pakistan' in the Muslim League's manifesto aims to phase out the power subsidy, bring an end to load-shedding and generate surplus energy by 2018. Moreover, the policy looks to privatize government-owned plants and some distributing companies thereby reducing government involvement in the sector, while forming regional transmission and power trading systems. Although the policy is fairly ambitious, the focus on sustainable energy and energy conservation, the creation of a single ministry that deals with energy and natural resources, and the introduction of transparent and competitive bidding are important factors for the long-run resolution of the crisis. While the Energy Policy is certainly promising it raises some key questions: (1) to what extent will the privatization of government plants raise energy tariffs and how will this affect consumer welfare? (2) Given our large-scale circular debt and the urgent need to meet said debt, what processes will ensure that bidding, especially by foreign interests looking to gain access to national power grids, is competitive and transparent? (3) One component of the energy policy is to aggressively develop Thar's reserves of coal, how will the local economy of Thar be affected, given that one component...?

The articles in this issue discuss various dimensions of the economy surrounding energy in Pakistan. The article by Rashid Memon develops a framework for understanding the political economy of rent-seeking in a localized energy market by exploring why firms in a small town labor market have

discriminatory hiring policies. The author's analysis shows that the hiring process is underlined by patron-client relations designed around tribal and caste connections. His findings point towards rent sharing between workers and firms with the dynamics of the market affecting the hiring process in the long run.

The second and third articles examine the causes of the ongoing energy crisis while also identifying the processes that must be enforced in order to overcome the crisis. Reehana Raza and Anjum Nasim place the real responsibility of the current energy crisis upon high levels of economic growth without adequate support from energy development with the high cost of setting up new energy projects acting as the main deterrent. Moreover, the authors identify that poor recovery of bills and low tariffs have contributed to the ongoing crisis. The last article of the bulletin is by Vaqar Ahmed who focuses on fragmented governance in the energy sector in Pakistan. The author identifies the competing and multiple interests of those involved in the energy sector as the chief detrimental forces to the budgetary process of the sector. Finally, the author suggests that strengthening of regulation while merging the energy ministries; minimizing corruption and disengagement of government from distribution are key factors for resolving the energy crisis in the long-run.

Contesting Resources: Rent Seeking and Conflict in a small-town Labor Market in Sindh¹

By Rashid Memon



This essay attempts to understand why firms in a small-town labor market appear to have discriminatory hiring practices. This labor market has several unique features. The three large firms in the market all depend on a local resource, natural gas. Moreover, the town is characterized by persistent semi-violent conflict between the firm and native residents (workers and non-workers). Precisely because of these characteristics, it seems promising to analyze this labor market from the perspective of natural resource rents and rent seeking behavior.² Firstly, the concepts of rents, competition, and rent appropriation provide insight into the role of networks in job matching as well as industrial strife. Secondly, identity politics around natural resource rents can help explain the overlap between labor and ethnic conflict. Thirdly, the generality of the idea of rents, coupled with inter-firm variation in hiring practices, permits drawing policy recommendations.

My argument revolves around the following key ideas: Firstly, there are rents in the input and product markets. These rents, based either on natural resources or the structure of industrial protection, are shared between firms and workers. 'Lucrative' jobs, which are not limited to prestigious jobs, are one mechanism of rent-sharing. Mostly unadvertised, such jobs are accessed through patron-client networks, and local residents tend to contest the firm's employment practices if they

are excluded from these networks. To the extent that patron-client networks are often organized around *biraderi/tribe* identities, rent-seeking behavior and the resultant industrial strife attains an ethnic hue. Finally, differences in bargaining strength of networks explain the extent to which local residents are able to influence labor market outcomes in their favor.

The remainder of this essay is organized as follows. In the next section I argue why I have eschewed the traditional productivity based framework in explaining hiring practices. Section 3 describes the nature and magnitude of rents in the fertilizer industry. Section 4 presents a literature review of why and how firms distribute rents; this section constitutes the theoretical framework that structures my field observations, which are presented in section 5. Section 6 concludes.

Productivity based frameworks

A large body of theoretical and empirical literature analyzes employment differentials across ethnic/racial groups within the framework of productivity differences. One strand of literature emphasizes the role of pre-labor market characteristics, human and social capital in explaining labor market outcomes (see Black 1999 for an comprehensive survey). This literature locates the source of the problem in deficiencies in human capital in the subaltern group. A second strand of literature focuses on the incomplete nature of job-contracts and highlights the importance of moral hazard. Influential papers, such as Summers and Bullock (1984) and Akerlof (1984) and Bowles (2001) argue that workers shirk when firms cannot specify

complete contracts and are unable to monitor workers perfectly. Shirking thus creates a wedge between actual and potential output. Ethnic groups could have different labor market outcomes if the proclivity to shirk differed across groups, or was perceived to differ. The reasoning has best been articulated under the rubric of statistical theories of discrimination: employers are unable to observe true productivity and perceive ethnic identity as a signal of productivity. If employers believe certain ethnic groups have lower average productivity (as a group) and they cannot observe individual productivity they would, say, offer a lower wage to a member of the subaltern group.

However, this model of prejudicial beliefs does not ultimately wash well as a theory of why discrimination should be long-lasting. If average group differences are perceived but not real, then employers should learn, over time that their beliefs are incorrect. Given the resources at their disposal, it seems unclear why firms cannot find methods of predicting future performance that render using the additional signal of ethnicity (Darity and Mason, 1998). Thus, orthodox microeconomics keeps returning to the position that the persistence of observed differences in economic outcomes between groups must be due to deficiencies in the group that experiences the inferior outcomes. Sometimes this deficiency is associated with poor schooling opportunities (Black, 1999), other times with culture. For example, the framework of Murray (1984) and Sowell (1981) suggests that African Americans have higher measured rates of unemployment than do Whites because African Americans have greater cultural preferences for nonmarket activities or because nonmarket activities yield more income than do market activities; that is, transfer payments and the consumption of leisure make market work seem unattractive.

A high value on “fun”, “excitement”, and emotionalism has characterized the less successful minorities (Sowell, 1975, pp. 144- 146; emphasis in original).

Clearly, these are powerful conclusions. The thrust of the argument is to absolve the functioning of the labor market of a role in producing differential outcomes (ibid, pg 83.) If true, they imply that the best social policy with respect to racial differentials in income is one of benign neglect: let market forces distribute economic rewards in accordance with the distribution of income-earning characteristics. After all, income-earning characteristics are a reflection of the market functionality of cultural traits, natural ability, and individual optimizing choices in the acquisition of productive attributes; the market will provide rewards in proportion to the various aspects of human capital. Or, if government is to intervene at all, then government should intervene to correct the dysfunctional value structure of low-income individuals (Mason, 1998).

An emphasis on cultural determinants of productivity raises the question of why such traits are concentrated, inter-generationally, among certain ethnic groups. Loury (1989) suggests that cultural values are exchanged through intra-group and intergenerational familial transfers. Many of these transfers take place not in economic markets but in private social arrangements. As a result,

“The inequality of family circumstances generated by historical economic [inequality] is exacerbated by differential access to the benefits of those quasi-public resources available only in the affiliational clusters or “communities.” . . . [An] intragroup “externality” is exerted, through local public goods provision.” (p. 274, emphasis in original)

It follows that an extremely intelligent African American might not possess adequate social capital

simply through exclusion from communities and clusters that transmit such capital. Such exclusion appears discriminatory. It is not rhetorical, then, to ask the following question: if the economy cannot provide a job to each individual willing and able to work, will groups that engage in social discrimination who also control the preponderance of employment decisions ration good jobs for those socially closer to them?

Rents in the Fertilizer Industry

For the economist, rents refer to “excess incomes”. More precisely, a person gets a rent if he or she earns an income higher than the minimum that person would have accepted, the minimum being usually defined as the income in his or her next-best opportunity. Rents may take the form of higher rates of return in monopolies, the extra income from politically organized transfers such as subsidies or the extra income that comes from owning scarce resources, whether natural or specialized knowledge.

In this essay, I focus on a district where natural gas was discovered in the 1950s. Following the find, the government encouraged the setting up of fertilizer firms. In a policy environment of import substitution and infant industry protection, the firms received significant rents from both the product and the input market; input prices were controlled and output prices were left to a market in which these firms had monopoly power (fertilizer firms in the area control 74% of the urea market). The firm that provides the gas, however, receives rents by definition, by owning scarce resources.

The difference between supply price and the market price of gas is a reasonable measure of the subsidy accruing to the firms. Since there is no

‘market’ for natural gas (prices are decided by the ministry of power), Gazdar and Saeed (2013) rely on a proxy for the market price — the international price of natural gas in a geographically proximate country, India, that imports natural gas. The difference between the proxy market price and the government administered supply price (well-head price), suggests the subsidy on fertilizer fuel is 75 percent and that on domestic consumption is 91%. A recent report by the Competition Committee of Pakistan CCP suggests that the fertilizer sector received Rs 77 billion over three years.³ While the exact rent can be argued over, I want to state upfront that this essay is not concerned about the “excessiveness” of the profit as is the concern of the CCP. My concern is that as long as there are non-zero rents in the market, there is a case for rent-sharing with workers.

The rent for the gas supplying company involves calculating the difference between the cost of procuring gas and the well-head price. In 2010, I met several locals who had owned the land on which gas wells had been found. I contacted my key informant again in May 2013. He reconfirmed that land owners get 5% of profit generated by their well, implying significant rents to the firm despite the arbitrarily low sale price.

Furthermore, there is evidence that the product market is also protected. The regulatory law, Pakistan’s Fertilizer Policy,⁴ states the following:

“Selling price of fertilizer shall remain deregulated on the understanding that while manufacturers will allow free market forces to prevail they will pass the benefits in the form of lower price of fertilizer to the farmers.”

Figure 1 provides suggestive evidence that the sector has pricing power in the market; the trends

in urea prices are much stronger than the general trend in the GDP-deflator. While state levies could be partly responsible for the increase in prices, the power to pass on levies to prices is itself an indicator of market power (rethink demand elasticity). It would be reasonable to say that there are economic rents in the fertilizer industry, rents that can be shared with workers.

Rents Sharing in the Labor Market

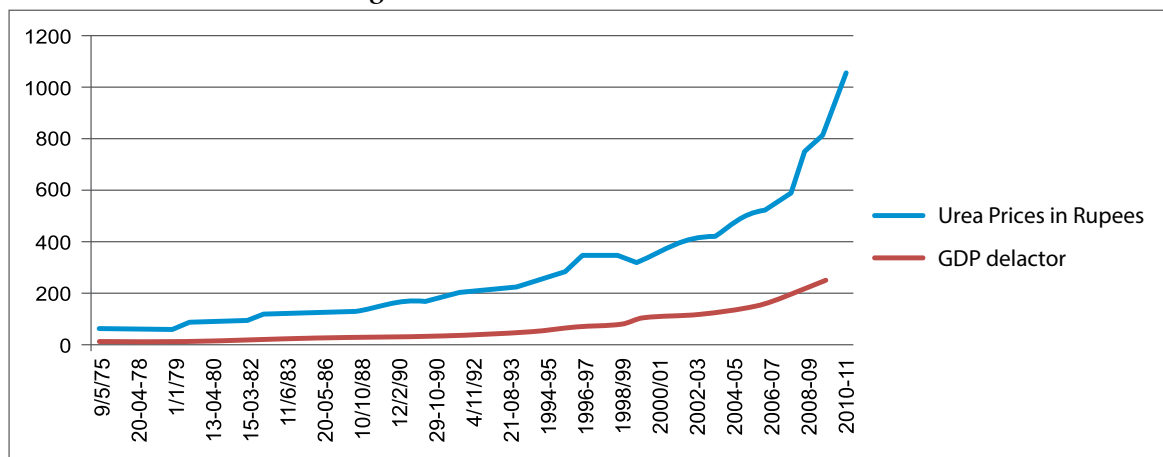
The foregoing discussion generates two questions. Firstly, are rents shared with workers and secondly, why would firms share rents appropriated from the input and product market with their workers? As for the first question, a long running strand of research has argued that employees share some of the rents earned by their employers.⁵ Early studies use data on wages and profitability at the industry level (Dickens and Katz, 1986) while later studies use firm-level data (Arai, 2003). Both literatures show a positive correlation between profitability and wages. How much of this is due to the sorting of high-ability workers to high-profit industries or firms is still unclear. Recent studies that use matched

worker / firm data to control for unobserved ability find smaller but generally significant effects of profitability on wages (Martins, 2009).

While I was unable to obtain data that would allow a precise calculation of the difference between pay in the high-rent sector, I do have evidence that is suggestive of the claim. In 1999 when I was an intern in one of the departments, I interviewed a firm driver who, at the time, was getting Rs. 16,000 a month. This driver had been with the company for a very long time and he suggested that other, younger drivers were getting half his salary. But, according to Labor Force Survey (LFS) 2008 i.e. 9 years later, the wage rate for drivers in 2008 was roughly Rs. 5000 a month. This implies that rents at low level occupations are quite significant.

Moreover, at least one company in the town hires workers for the same occupation at three levels: permanent, fixed and sub-contractual. Permanent jobs involve the highest pay and perks, followed by fixed (lower wage and no perks) and finally sub-contracted workers. Technical workers are never sub-contracted, but low skilled workers can be permanent or sub-contracted. I met technicians

Figure 1: Urea and General Price Trends



with the same diploma, allegedly doing the same work, some permanent and others fixed. I also met unskilled workers such as, drivers, gardeners and helpers who were spread across the employment hierarchy for no convincing reason. This suggests different groups of workers get different shares of the rent.

But why should firms share rents at all? Several different pieces of (related) literature can be invoked to answer this question. Firstly, rent-sharing through networks is compatible with purely productivity based hiring, if networks are a repository of information or help in enforcing contracts through interlinked transactions.⁶ Secondly, Akerlof (1980) suggested that, in an environment where effort cannot be contracted completely, jobs and their associated rents can be seen as a partial gift exchange. In Akerlof's original model, workers acquire sentiments for each other as well as for the firm. As a consequence of this sentiment, workers acquire utility for an exchange of "gifts" with the firm— the amount of utility depending upon the so-called "norms" of gift exchange. On the worker's side, the gift given is work in excess of the minimum work standard; and on the firm's side the gift given is wages in excess of what they would receive if they left their current jobs. As a consequence of worker sentiment for one another, the firm cannot deal with each worker individually, but rather must, at least to some extent, treat the group of workers with the same norms, collectively.

Thirdly, a body of literature has contextualized profit maximization itself. (Sitcher, 1950) found that managers may well have objectives other than the maximization of shareholder wealth, and shareholders may find it difficult to monitor and/or control their behavior. Kahnemen et al. (1986) have suggested that norms of fairness often constrain

profit maximization. Kreuger and Summers (1986) note that such practices are more common in industries that are concentrated, have high profits, and have relatively small labor shares. Under these circumstances, managers might maximize a utility function which includes both profits and the well being of their workers.

Bergman (1974) suggested that even where rent-sharing lowers profits it may at the same time raise the real consumption of profit-takers (consumption being the ultimate goal). In the context of inter-linked markets, this would imply two things. Firstly, capitalists are compensated elsewhere (in social relations, through risk sharing, political voting etc.). Secondly, we can now explain why capitalists may want to share rents with some workers and not others. To be precise, capitalists would want to share rents with those in their network, people with whom they do have interlinked transactions. The flip side is that they would not want to share rents with those whom they do not have interlinked transactions. They might even run expenditures to limit the distribution of rents to their networks.

Networks and the distribution of economic rents

There is no reason to believe that rent seeking activities in the district of interest would be different from rent-seeking in Pakistan in general. This allows me to present insights from the recent literature on rent seeking (see Khan and Jomo for an exhaustive review). This work suggests that rent-seeking across Pakistan, India and Bangladesh share similar features. Firstly, a large number of factions compete for rents. And in each case, members of the middle classes play a key role within these factions. The middle classes, are in the main, the educated section of the population, both employed and unemployed, and the richer peasants

whose sons and daughters provide new entrants into the educated classes through universities and colleges. While capitalists and landlords may, as individuals, control significant resources, they are too few in number to control the political process themselves. In contrast, the middle and lower middle class have the organizational power to dominate politics. Within the middle classes, Bardhan (1984) identifies professionals as one of the three classes forming the coalition of dominant classes in India, together with capitalists and landlords. These professionals then form patrons of their own network.

It follows that professionals and their networks are important in understanding how rents are distributed. Moreover, while networks are often constructed around reciprocal relations in several markets, there is a tendency for networks to coalesce around *zaat/biraderi*/ethnic identity, at least partly because of how *biraderis* are geographically clustered. Nevertheless, it would not be untrue to argue that people might be members of several independent networks, some around *zaat/biraderi*, some around ethnicity and others around professional identities.

But rents thus appropriated and distributed by network patrons do not go uncontested; they are bargained over by different factions and networks, sometimes violently. It becomes critical, therefore, to understand the bargaining power of different factions and the source of their strength. Below, I use these ideas to organize my field findings.

Notes from the field: Rents and Conflict in District X

I visited district X, first in 1999, as an intern in one of the fertilizer firms and later in 2010 as a PhD student. In both visits I witnessed conflict

(*dbarnas/strikes*) between the firms and native workers and non-workers.⁷ In 1999 the natives were demanding more jobs from firm 1, and in 2010, firm 2's temporary workers were demanding to be made permanent.

In both years, the native workers rationalized their *dbarnas* by invoking two fairness norms. The norm invoked by the strikers outside Firm 1, in 1999, was that natural gas was a local resource and they had first right to any employment opportunity associated with 'their' natural gas. The underlying accusation, of course, was that the management, which was non-local, gave jobs to people from other provinces, notably Punjab. One of my respondents from my 2010 field work, an employee of firm 1 estimated the ratio of *Sindhis/non-Sindhis* to be 30/70 in Firm 1 and 70/30 in Firm 2. While these ratios might not be exact, my other respondents concurred that the ratio was significantly different across firms.

The norm invoked by temporary workers in 2010 was more direct: they wanted locals and non-locals with the same job-title and responsibilities to be treated in the same way. During the course of my interviews, I met a well-operator who had been a temporary worker for 18 years and workers much younger than him had been appointed as permanent well-operators. My other respondents, both permanent and temporary, concurred that 90 percent of the permanent well-operators were non-locals. Reports of the premium on permanent jobs ranged from 30 to 50 percent.

Jobs and Networks

If the framework presented in the earlier sections is correct then one would expect, firstly, that networks are important and, secondly, that natives and non-natives differ in the strength of their network. By

network strength, I mean i) the proximity of the network patron to decision-making bodies and ii) the ability of a network to make credible threats to its opponents (I will say more on this later).

Four specific instances point to the importance of networks. Firstly, a feature of district X that stood out to me in 1999 was a small village of Punjabi speaking Christian sweepers. At that time, my Sindhi respondents had been accusing Firm 1 management of giving away even sweeping jobs to 'Punjabis'. It turns out that the first sweepers had come to the area when the firm had been set up some 50 years ago. The management at that time saw it fit to give janitorial jobs to these people; some of the earlier migrants had worked for senior managers prior to joining firm 1. My respondents from the sweeper community told me that occupational mobility within the community was quite low, and the children of the janitors took over their parent's occupations in any of the three local firms. When I had casually discussed this with an employee of a firm, he found it quite natural; "after all, that is what members of this community are good at doing," said he. Patrons' perceptions about this community's place in the occupational structure not only created the opportunity for the sweepers to migrate but also limited them occupationally!⁸

The second instance of network effects involved a member of the local community who joined Firm 1 in a senior managerial position. It turns out that he secured jobs (peons, clerks and drivers) for a very large number of people of his clan. One respondent, who was a beneficiary of this hiring, told me that, in return, they kept away from unions and did not participate in any of the *dbarnas*. Significantly, these workers are permanent workers paid at par with the other non-local workers. Note that this finding weakens the classical Beckerian prejudice

hypothesis: it seems that employers or employees do not harbor an aversion for a particular group. Once a member of a group becomes a professional and part of the elite network, he is allowed the capacity to distribute some rents to his clients, probably as a part of reciprocal arrangement with his elite colleagues.

The third instance of network significance was the recruitment of permanent workers in firm 2. Respondents who were members of the labor union argued that the hiring decisions of permanent workers were made in Islamabad, and invariably these workers were from the Punjab. They were actually referring to the hiring of a gardener; there were permanent gardening jobs filled by migrants and temporary gardening jobs filled by locals. When I interviewed my key respondent in May 2013, he informed me that several permanent drivers had been hired, and the hiring decisions made in Islamabad. All the new appointees were from the Punjab and associated with senior management in some capacity.

Finally, a seemingly pervasive network was that of ex-army men. I met a person in a junior administration position (permanent) who had been a sergeant in the army before retiring. A respondent told me the majority of guards in Firm 2 were ex-army and provided the network for other ex-army men. At that time, I did not inquire into whether the network was a purely professional network (only the ex-army identity was important) or whether it was a biraderi network where it just happened that a large number of people of a biraderi were in the army.

Differences in Network Strength

In the story described above, note that locals were able to get into Firm 1 due to a management

professional who was a patron. Similarly members of other networks (local and non-local) also gained access to jobs through a patron who was a professional and close to decision making. The uniting idea is a patron close to decision making.

This said, it was also sometimes possible to get access to jobs without patrons in professional positions. Significantly, this was more probable for one of the three firms in the area, the gas supply company. Even more significantly, there is another firm in the area under the same management but where this finding does not hold, so the main inter-firm variation is the product market. In fact, as I show below, the main variation is in the cost of enforcing property rights associated with the nature of the product.

As I mentioned above, I witnessed a lot of conflict outside firm 1, on the road that connects the firm to the highway. The firm itself was a walled compound guarded by firm security. Since the road was public property, the natives could block the road threatening the security of the firm management. One of my respondents told me that they could block trucks taking the product from the firm to the market as well. This said, compared to firm 2 there was very little physical space for confrontation. Firm 2, the gas supply company, however, drew its product from wells spread over several hundred square miles. This area was dotted with villages. It is clear that local residents could threaten the security of the firm's property rights. This said, my respondents told me the last such threat happened 10 years ago (under patronage of the *Hari* Committee).

Despite the fact that firm 2 had a higher local/non-local employment ratio, the locals were generally temporary workers whereas non-locals were permanent. And, in 2010, they had organized

a struggle to get permanent jobs. Surprisingly, the threat of well-closure was absent from their bargaining. My respondents were of the view that over the last decade years the firm had co-opted local influential people who essentially worked as strike breakers. In particular, the sub-contractors had either inherited influence or, by virtue of the profits from sub-contracting, had become influential in the last decade and a half— influential enough to break strikes by force if necessary. My respondents were also of the view that sometimes these subcontractors would support strikes to blackmail the firms and obtain jobs for some family member or friend, before breaking the strike. What seems to have happened is that the strength of the local networks has been undermined, their threats made incredible, their patrons co-opted.

There is, indeed, an alternative way of explaining the sub-contracting phenomenon: a firm rationally acts in ways to reduce its transaction costs. In this case, the firm subcontracted local workers to avoid managing labor conflict. Since sub-contractors provide a service, we should, then, see a market for these sub-contractors. My respondents tell me this is not so and the firm chooses subcontractors carefully. My interpretation is that since the firm wants to counter a collective threat, it is the network that has to be weakened from within. In my opinion, therefore, a rent-seeking networks perspective appears to be more attractive than a simpler transaction cost perspective.

In conclusion, my impression was that the conflict around Firm 1 was much simpler compared to that around Firm 2. In the case of the former, it was seen primarily as a law and order problem rather than a bargaining issue and the firm used its contacts with the state to break *dharnas*. In May 2013, I interviewed a retired bureaucrat who had been a senior district administrator and

actively involved in the strikes of 1999. He shared the firm management's view that the *dharnas* and strikes were sponsored by local *Pirs* and influential landlords who wanted to be bribed. He had not hesitated in threatening *dharna* participants with sections 107⁹ and 110¹⁰. The state, therefore, was instrumental in breaking the collective power of workers and their non-working kin. When I interviewed the retired bureaucrat, his home did not suggest he had gained financially from his positions of power. Nevertheless, the irony of the fact that firm management offered district administration officials their best guest rooms when they were visiting the area to resolve the firm/worker/native-non-worker disputes was lost on him.

Conclusions: Generalizing towards policy goals

These field findings can be generalized at two levels. Firstly, natural resources are abundant in Sindh and Baluchistan; all labor markets around such natural resources have witnessed industrial strife, have taken up enormous state resources, and have fed into anti-nationalist sentiments (Das, 2009). To the extent that the main problem is the sharing of rent, the first-best (radical) solution is to abolish the rent itself, in this case, rationalize the price of gas and liberalize the import of fertilizer. Under the 18th amendment, the revenue from natural gas accrues to the province. If that happens, at least at the provincial level, the claim for rent-sharing through employment opportunities loses its moral high ground. Intra-provincial distribution, however, will remain a problem. The impact of such policies on fertilizer prices would also have to be studied and its distributional impact paid attention to.

The second level at which these findings can be generalized is that, since markets are never perfect, there are always rents; if not from natural

resources then from informational asymmetries. These rents are competed for and rent-seeking activities could be highly unproductive in the sense that those resources could be put to better use. Furthermore, such economies can exhibit poverty traps which are inhabited by certain impoverished communities rather than others. Such inequalities need redress. One possibility of redress is a mixture of merit and regional quota system for positions of higher management. The latter need not preclude merit as one can construct a merit list within a region and hire only once minimum criteria are met. The example of Sui Southern is illustrative: when Sui gas was accused of hiring on the basis of ethnicity, the company fired a very large number of workers, hired IBA Karachi to conduct an entry test and rehired those who passed the test. A large number of the favored ethnic group returned. I want to emphasize that in case where rents are generated through government legislation, such as in the case of fertilizer, it is incumbent upon the government, both federal and provincial, to encourage mechanisms that combine merit and affirmative action. This will be particularly useful going into the Thar coal project.

Finally, most firms have a community social responsibility plan according to which they are legally required to invest in local infrastructure. The magnitude of social expenditure ranges from \$40,000 to half a million dollars per year, depending on the production rate of the wells (GOP, 2009). Given the company's complaints regarding the absence of skilled workers in the area, perhaps some of this money should be spent on education and training programs. If the network analysis is correct, such expenditure could create the mid-level professionals that could serve as patrons for their communities. But, if the network analysis is correct, it is not clear why firms would agree.

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Notes

¹ I am grateful to Haris Gazdar for a critical reading of an earlier version, to local contacts in the field work district, and to the editors of the Policy Bulletin. All errors remain my own.

² It is also possible to explain my field findings using a transaction costs approach. If turnover costs of hiring from one ethnic group are higher than the turnover costs for another group, and workers are perfect substitutes, firms would

appear to have ethnic hiring preferences. But the simplest models predict perfectly segregated firms, and only by bringing in some complementarity between workers can we get the mixed ethnic labor force I witnessed in my field work. Such models are complicated. A framework based on rent-sharing is much simpler; it also resonates with how different actors in the market describe the situation.

³ One fertilizer company argues, in the same report, that the entire subsidy was passed on to the consumers (pg. 13). The reasoning appears to be based on the idea that importing urea would have been even more expensive (pg 17). While such a calculation does imply that urea should not be imported, it does not imply that the subsidy was passed entirely to the consumers. In fact, the correct counterfactual would involve selling the natural gas in the international market and compare those revenues with the costs of importing fertilizer. There seems to be such a calculation on pg. 116 “[...] the subsidy given by GOP is through differential in feed and fuel. With total domestic production of 4,901 m ton, this translates to a benefit of Rs. 23 billion to the farmers as against Rs. 34 bn that is attributable to feed/fuel cost differential.” The Rs. 23 billion benefit is only for 2011 so we don’t know if higher benefits were passed on to farmers in the other years. On the face of it, it seems that Rs. 11 billion still accrued to the fertilizer sector as a rent. But more importantly, the Gazdar and Saeed (year) figures suggest that even the gas-fuel price is subsidized so the differential between gas fuel and gas feed does not accurately capture the subsidy involved.

⁴ <http://www.nfdc.gov.pk/policy.html>

⁵ The idea of rent-sharing by a cartel of workers appears in Adam Smith (1976, Book I, Chapter

8). The post-war-neo-institutionalists (e.g. Lester, 1952) emphasized firm profitability as an important determinant of wages.

⁶ The role of networks in mitigating moral hazard problems is diminished by advances in technology. Consider the case of a driver being trusted with an expensive car: firms can be expected to invest in insurance and tracking technology regardless of the identity of a driver. Finally, firms are generally on better terms with the law administration than workers, thus weakening a firm’s reliance on social networks for securing property.

⁷ It was particularly interesting how native residents would rally together if they perceived an injustice to native employees. The Hari committee, sub-nationalist political organizations and NGOs were especially active on this front.

⁸ I am reminded of Haris Gazdar’s work on the migration of land-owning castes from East Punjab to West Punjab at the time of Partition. The *kammis* followed their patrons in both directions and retained their status in the occupational hierarchy relative to their patrons.

⁹ Abetment of a thing

¹⁰ Punishment of abetment if person abetted does act with different intention from that of abettor.

“Who is responsible?”

By Reehana Raza and Anjum Nasim



A response to an article by Sartaj Aziz

Mr. Sartaj Aziz, senior vice president of PML-N, in his article in *Pakistan Today* on April 23 (2013) has rightly argued that generation capacity is not the cause of the present energy crisis and his explanation of the circular debt is eminently reasonable. However, his position on the 1994 energy policy is untenable. In particular, the figures that he has mentioned on hydel-thermal mix in 1994 as part of his critique of the 1994 policy are incorrect.

The 1994 power policy was framed in the backdrop of power shortages which date back to 1982. In 1985, the government of Pakistan announced an initiative to encourage private participation in power generation which led to the development of Hub Power Project (Hubco) in 1987. Construction of the power station began in December 1992, financial close was achieved in January 1995, and the project started operation in 1996. The experience from Hub Power Project cleared the way for attracting more private investment in the power sector.

In 1994, electricity shortage was 2,000 MW during peak demand, and electricity was available to only 40 percent of the population. The 1994 power policy projected an eight percent annual increase in energy demand over the next 25 years.

A solution to the power shortage which addressed the problem in two to three years had to rely on thermal energy. A solution based on hydel power, which involved greater capital cost but lower operating cost, would have taken seven to ten years, at least.

While the fast-track solution entailed higher energy cost, this policy has to be seen in the context of the loss of economic growth that the economy was experiencing due to the energy shortage. Although the 1994 energy policy invited investment in the power sector and not specifically in thermal power, the investments that materialised in the next three to four years were thermal-based.

Mr. Sartaj Aziz (2013) claims that in 1994, out of the total installed capacity of 11,000 MW, 60 percent was hydel and 40 percent was thermal, and in the next few years this mix was reversed from 60:40 to 30:70. This is not correct. The share of hydel-power in 1994 was 42 percent and not 60 percent.

The statement made by Mr. Sartaj Aziz (2013) that the additional thermal power capacity installed under the 1994 power policy agreements was about 6,000 MW is also not correct. If Hub power, which is being claimed as a project of the first PML-N government, is excluded, the actual installed capacity under the 1994 power policy was 3,000 MW, not 6,000 MW (Fraser, 2005).

The share of thermal power in hydel-thermal mix in 1994 was 58 percent. If we add the Hub power capacity (1,292 MW), the share of thermal power increases to 62 percent. The Ghazi Barotha hydel power project, which first Project Cost (PC-I) was approved in 1994 and became operational in 2003 and 2004, added 1,450 MW of generation capacity. The short-term impact of the 1994 policy (before the Ghazi Barotha became operational) was to

increase thermal share in the hydel-thermal mix from 62 percent to 70 percent. The long-term impact of the 1994 policy on hydel-thermal mix (after the Ghazi Barotha became operational) was a change of thermal share from 62 to 64 percent. Therefore, the impact of the 1994 policy, when complementary public sector investment in hydel power is taken into account, is not very dramatic.

The 1994 policy served the purpose of addressing short-term energy shortages but more power was contracted than the economy could absorb in the short term, especially because of anemic growth in that period. The “dazzling speed” that Mr. Sartaj Aziz (2013) has referred to and the lack of transparency in awarding contracts had added to the perception of corruption. Notwithstanding these perceptions, prices offered under the 1994 policy were comparable with those offered by Indonesia, Philippines and India at that time (Fraser, 2005).

Fraser (2005) also reports that in July 1998, the PML-N government served Notices of Intent to Terminate to seven independent power providers (IPPs) on grounds of corruption and to two on technical grounds. Evidence on corruption charges was not presented in court and HUBCO was constrained by courts to seek international arbitration. Eventually a number of IPPs agreed to tariff reductions.

After many years of slow growth, the economy picked up between 2003 and 2004 and for the next four years the growth rate was between 5.8 and 9 percent. This growth rate would have been impossible without the availability of electricity that was made possible in large part by the 1994 energy policy, and contributed cumulatively more than \$44 billion to the economy during the four-year period (2004 to 2007) over and above what

would have been possible at the 3.4 percent growth rate in the previous four years of the Musharraf government.

The high growth rate during this period had started to create shortages and new thermal projects were approved during this period and started operations during the 2008 to 2013 tenure of the PPP government. A number of small hydro plants were commissioned, while some large hydro power plants are under construction including the Neelum-Jhelum hydro project with 969 MW capacity, first approved in 1989, on which construction started in 2008 and is expected to be completed in 2016.

The hydel-thermal mix in 2012 was 30:70. New thermal power projects during the PML-Q government were approved at the time when the economy was growing strongly and electricity shortages had reappeared. The commissioning of these projects coincided with major escalation of international oil prices. The government policy of not passing the higher cost to the consumers and keeping tariffs low creates excess demand. Meeting the entire excess demand would involve unacceptable fiscal burden. The extent to which the government is willing to bear the subsidy burden determines the extent of load shedding.

The tariff subsidy burden is made worse because of poor recovery of energy bills, power theft and pilferage, relief provided to consumers by courts, and non-payment of dues by provincial governments' departments and agencies, all of which add to the problem of circular debt and load shedding.

Even though load shedding can be addressed to a considerable extent if consumer tariffs reflect the higher cost of generation, this would involve

rationing through the price mechanism rather than quantity rationing through load shedding as is being done at present. Higher tariffs affect the competitiveness of our industry, not to mention the greater incidence of power theft and other corrupt practices. Therefore, the search for cheaper forms of energy has to be a major priority. Generation of electricity through hydro power is cheaper but project engineering and social, environmental and the political dimensions are far more complex than those of thermal power. Other power options based on wind and solar energy are in their infancy in Pakistan. Thermal energy based on Thar coal reserves is also at an exploratory stage. Let's hope the new governments will focus on indigenous and renewable resources for power generation, which have become economically far more viable because of major escalation in international oil prices since 2008.

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Overcoming Fragmented Governance: The Case of Energy Sector in Pakistan

By Vaqar Ahmed



The outgoing democratically elected government in Pakistan continued till the end with its predilection for big government in all its definitions. The ballooning fiscal deficit did not prevent the government from increasing its promises for public sector jobs and widening the coverage for payments which took the form of cash and non-cash transfers. Economists have been fascinated by such behavior and public choice theory expounds on how government officials pursue public interest but also act for self-gain (Rowley and Schneider, 2008). The budget-maximizing model (Niskanen, 1994) is also driven by bureaucracy at the cost of efficiency. In this article, we try to see some reflection of the above mentioned and try to trace the roots of Pakistan's energy crisis in fragmented governance structure.

A fragmented government structure can well involve competing objectives as well as a multiplicity of similar interests (Young, 2011). However, more detrimental in a developing country setting is the wastage of budgetary resources that have substantial opportunity costs. Furthermore, any inclination to reduce such fragmentation in the future implies political pressures on the government to not take painful measures such as clustering activities in one place and disengaging some human and financial resources. Even schemes such as golden handshakes in public sector organizations have met resistance from unions (Boycko, 1996).

Recently in Pakistan, the Planning Commission's Framework for Economic Growth observed that the governance structure in Pakistan has evolved in a manner where a large subsidies outlay provides stop-go cycles of injections to maintain recurrent expenditures. The Framework further details that the modern day government in Pakistan is either competing with the private sector in various productive sectors of the economy or has a footprint in several sectors through regulatory and other powers over pricing mechanisms (Government of Pakistan (GoP), 2011).

A very similar observation can be made specifically for the energy sector in Pakistan. A term commonly attributed to the crisis in Pakistan's energy provision is circular debt which in turn is an outcome of fragmented governance. If we breakdown the causes of circular debt, we realize that this burden has been piling due to the following delays (GoP, 2013):

- Delays in tariff determination,
- Delays in notification of the tariff by the government,
- Delays caused by a confusing fuel price methodology,
- Delays and failure in revenue collection by power distribution companies (DISCOs),
- Delays by the Ministry of Finance in payments on account of the tariff differential subsidy,
- Delays in decisions on stay orders carried out by the judicial system on fuel price adjustments, and transmission and distribution losses.

While the aforementioned issues should be tasked to a singly energy authority in the country, the delays

continue to occur because of the different domains where these grievances are addressed. When the domains are being managed by representatives belonging to a weak political coalition, the matter becomes more prolonged.

In the first nine months (July to March) of the current fiscal year 2012-13, the finance ministry gave Rs270 billion in power subsidies against the target of Rs185 billion for the whole year. There was an increase of 141% in power subsidies over the same time period last year (Ministry of Finance, 2013). Apart from the inter-corporate debt (another name for circular debt), the aforementioned system is also marred with heavy inter-corporate disputes. For example in the power sector, the federal government’s authority over consumer tariffs is counter to the exercise of regulators whereby they determine the differential tariffs for each DISCO. Similarly, subsidies provided to tube well users are resulting in disputes between provincial governments and DISCOs. The boards that govern DISCOs, which include private sector participation, are turning out to be a mere formality.

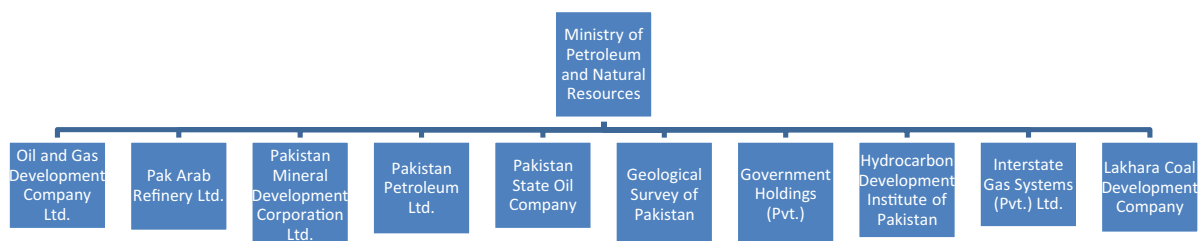
The next section describe the various actors in the energy sector of Pakistan and how the costs of

energy provision increases due to lack of integrated channelization of policy actions between these actors. The article then suggests some short-term measures to prevent fragmentation in the energy sector and reduce the monetary costs of such delays. The article then considers the critical question of why there are so little incentives to move beyond the status quo in the energy sector, if remedial measures are already know. Finally, the article recommends an approach to create demand-side pull for energy reforms through social accountability tools.

Actors in Pakistan’s energy governance¹

Figure 2 shows that apart from the core tasks of Ministry of Petroleum and Natural Resources whereby it is responsible for ensuring the availability of oil and gas, there are other ownership and management functions that it enjoys through public sector enterprises under its jurisdiction. Interestingly, when one looks at the website of Ministry of Privatization, several of these corporations can be found on the sale list. This precisely is the starting point for our analysis of the public sector overhang in the energy sector ministries and departments.

Figure 2: Activity portfolio at the Ministry of Petroleum and Natural Resources



The scenario is not very different in the Ministry of Water and Power (Figure 3) whereby on several occasions there have been demands from various quarters that DISCOs should be completely privatized. We know now from the recent data that even in the case of power generation companies

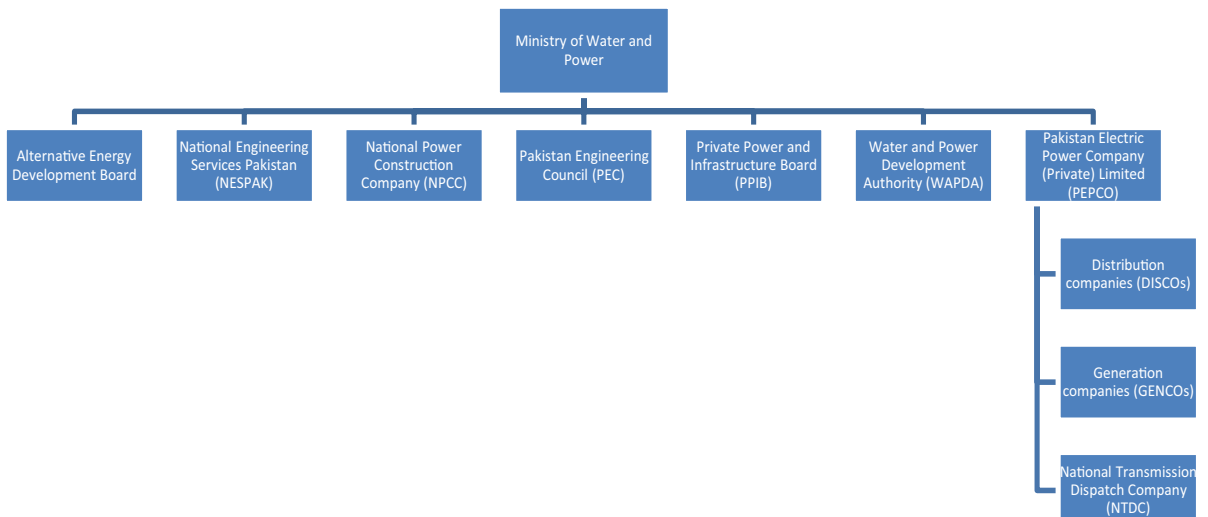
(GENCOs), the efficiency level is far below the Independent Power Plants (IPPs). However, GENCOs continue to remain operational because of an arcane rule which directs the government to only provide imported oil on a credit basis to GENCOs and on a cash basis to IPPs.

At the federal level, the fragmentation and control over units that should otherwise be managed by the private sector is not limited to the above-mentioned two ministries. Figure 4 depicts various other energy sector players at the provincial and federal levels. We see the research aspects being undertaken by the Ministry of Science and Technology. The regulatory bodies, National Electric Power Regulatory Authority (NEPRA) and Oil and Gas Regulatory Authority (OGRA), approach the chief executive of the government via the Cabinet Division. We have seen in the past five years that waiting for the chief executive to vet the regulatory orders in fact implied lessened accountability for the Ministry of Petroleum and Natural Resources and the Ministry of Water and Power, given that both these ministries were also reporting to the same chief executive of the federal government. This propelled the Supreme Court of Pakistan to take *suo moto* notice of the clear conflict of interest. However, several energy sector experts have suggested that actions by the Supreme Court further aggravated the matters in the energy sector and proliferated the already existing uncertainty at the policy level. Figure 3 also includes the provincial energy departments

that need to be effectively empowered to manage at least the administrative losses. This is particularly important in the aftermath of the 18th Amendment which has made devolved powers available to the provinces to manage generation opportunities and energy-related levies and to interact independently with the private sector companies who are willing to invest via automatic or government routes of foreign direct investment in energy.

A more important question to ask at this stage is how the federal and provincial players in the energy sector, mentioned in Figure 3, interact. While answering this, we can establish at the outset that there has never been a set meeting and reporting schedule for coordinating the energy sector, the lack of which is especially detrimental in the event of an emergency. Initially, issues were taken on a need basis to the Economic Coordination Committee (ECC). The ECC could only forward recommendations to the Cabinet and wait for its approval. However, once the supply and demand gap in the energy sector widened greatly, the Cabinet Committee on Energy was reinstated. Interestingly, this was headed by the same Chair responsible for heading the ECC. Thus, there was

Figure 3: Activity portfolio at the Ministry of Water and Power



no effective decentralization that could bring about efficiency in the management procedures.

One of the key consequences of the above mentioned can be seen in Table 1. We exhibit here the primary and related causes of circular debt. More importantly, in FY 2012, PKR 234 billion could have been saved had procedural delays (owing to fragmented decision making) related to tariff determination, fuel price adjustments and DISCOs' claims not occurred.

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Figure 4: Ancillary actors in the energy sector

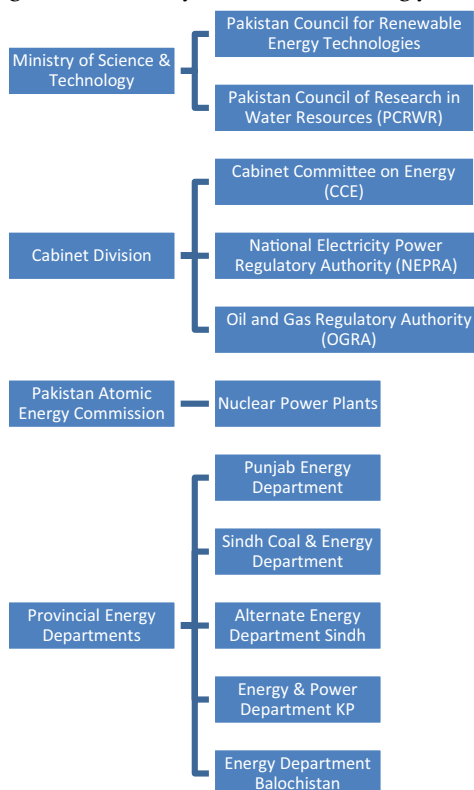


Table 1: Circular debt growth from 2006 to 2012 (in Rs billion)

	2006	2007	2008	2009	2010	2011	2012
Primary causes:							
Stock of debt (beginning of the year) (1)	84.07	111.26	144.99	161.21	235.65	365.66	537.53
Non-collection							
DISCOs' receivables from:							
Federal governments	0.22	0.35	0.08	0.15	1.79	1.57	0.19
FATA	10.87	6.36	9.43	10.24	-78.34	4.3	13.42
Provincial governments	2.25	0.75	5.09	7.17	16.72	36.07	15.84
AJK government	0.54	0.27	0.46	1.18	2	5.5	6.05
Agri-tubewells	0.42	1.28	1.07	3.01	3.46	-3.68	-3.12
Private consumers	9.08	7.96	9.64	19.88	25.59	39.29	54.55
Sub-total	23.38	16.97	25.77	41.63	-28.78	83.05	86.93
CPRA receivables from KESC	3.81	16.76	26.74	-11.87	4.04	-1.79	13.78
Total non-collections (2)	27.19	33.73	52.51	29.76	-24.74	81.26	100.71
Tariff and subsidy issues							
Tariff determination and notification delay	N/A	N/A	N/A	N/A	N/A	N/A	72.19
Fuel price adjustments	N/A	N/A	N/A	N/A	N/A	20.1	33.19
Difference between DISCOs' TDS claims versus actual disbursed	N/A	N/A	-36.29	39.66	134.84	48.68	106.02
Difference between DISCOs' NEPRA-allowed versus actual transmission and distribution losses	N/A	N/A	N/A	5.02	19.91	21.84	22.78
Sub-total of tariff and subsidy issues (3);:	N/A	N/A	-36.29	44.68	154.75	90.62	234.18
Total circular debt (as of year end) (1+2+3)	111.26	144.99	161.21	235.65	365.66	537.54	872.42

Source: GoP (2013).²

Short-term energy governance reforms³

We draw our recommendations from recent research conducted at the SDPI. These recommendations have been split into three broad segments of energy governance—regulation and operations; pricing; and disengaging the government from activities that can be more efficiently performed by the private sector. Furthermore, we will limit our discussion to measures that may be taken in the short term with minimum legislative effort.

In the operations aspect, we first start by looking at how best the regulator's role can be strengthened. We know that, theoretically, both NEPRA and OGRA have independent boards; however, as organizations both have been termed toothless for reasons already discussed in the article. Secondly, conflicts of interest need to be reduced and instances such as retired civil servants being posted as regulators need to be checked. Induction of professional management in the regulatory bodies should be a foremost priority. Appropriate legislative changes are still required to prevent governments in power from tampering with the autonomy provided to these regulators.

The government will, however, need to provide policy advice on routine matters to the regulators and this should be done through the independent boards of these regulatory bodies. However, for the government to provide any advice, it first needs to revisit its own professional capacity. Until today, transmission is being optimized manually. While software solutions are available across the world, the Ministry of Water and Power has not been able to acquire this capacity. In our focus group discussions, which included the Caretaker Federal Minister for Water and Power (see References and Reading, 30th April 2013), it was revealed that recruiting and retaining professionals in

the ministry cadre is a challenge. The federal administrative structure lacks career planning for professionals from any field. Similar concerns were raised by the Planning Commission's energy wing which has had a high turnover of professionals for the past two decades. We should also mention here that the delays in coordination at the federal level between the two ministries are also costing the exchequer dearly. The proposal to merge both ministries has been on the table for some time and it should be undertaken now.

On the pricing reforms, both ministries at the federal level need to phase out hidden and cross subsidies. The Finance Division should ensure compliance of this task if it wishes to slash its current fiscal deficit by at least one fourth. Secondly, for both power and gas, the rationale for producer and consumer prices needs to be logically framed. The prices for producers are different across sectors. Strong economic reasoning needs to be established for all forms of sectoral pricing. Thirdly, while supply-side measures will be more important in keeping energy prices under check, the full cost recovery for service delivery is equally important. This can be achieved through two short-term measures. The first measure is the installation of smart metering, the proposal for which has already been moved by the Planning Commission and is now resting with the Ministry of Water and Power. Secondly, provinces should be given a wider role in bringing down the default payments (and administrative losses). An accountability framework at the Ex/En level should be developed with a third party check outsourced to a private sector monitor.

On the appropriation of responsibility between government and markets, it is important that in the longer term the government should focus on the policy and planning aspects of energy, while leaving production, funding and management

to the private sector. For privatization or public-private partnerships to flourish in the energy sector, the foremost step will be for the government to underwrite the entire stock of circular debt and make it part of the government’s own liability. After that, DISCOs should be privatized. The private sector manager will have a better eye for the pilferage that currently strains this sector. While privatization lessons may be learnt from the Karachi Electrical Supply Company (KESC) example, this organization is also a receiver of subsidies from the government. Its efficiency levels have been termed well below comparable independent power plants (Abbasi,2012).

Social accountability tools for energy sector reforms

The civil society can use tools of social accountability to counter existing distortive incentives for maintaining the status quo. Similarly, consumers can shape public perception and thereby political will, to perform.

Social accountability tools have recently been used by civil society organizations with the help of local communities to hold local administrators in the education and health sectors accountable (Ringold et al., 2011).

We propose a framework for stakeholder engagement (Figure 5), whereby citizens as clients make a coalition and drive the reform process. Local area civil society organizations can act as the secretariat for this effort. By ‘local area’ we imply, for example, the catchment area of a single DISCO. In the first phase, a social accountability tool such as the citizens’ report card may be used to document the challenges faced by producers and consumers as clients. This scoping exercise will also document the citizens’ own responses if any local area coping strategies have been developed by communities or businesses.

In the second phase, consumer associations and business chambers should lead the effort of framing clear policy advice for energy security in their district and develop a mechanism to follow up on this policy advice with the administrators. Usually the follow-up work is done by social accountability committees which are formed in local areas. Finally, after a certain time period another round of the citizens’ report card should reveal if the executive or legislative branch of the government has responded and on what specific reforms. The clients can quickly remodel their approach to social accountability if they feel that the government’s response has not been

Figure 5: Ancillary actors in the energy sector



satisfactory. By doing several such rounds, the communities and business chambers/associations can in turn develop the capacity to benchmark various political regimes and how well they have performed.

Conclusion

As the caretaker finance team of Pakistan returned from the IMF, there was a clear message that the IMF will not further ease any balance of payments difficulties unless the country lays down a clear plan and commits to phasing out subsidies in the energy sector. This ultimatum should now be taken as an opportunity to at least mend the business model that plagues Pakistan's energy sector.

This short article has analysed the fragmentation in Pakistan's energy governance and how such fragmentation has been resulting in losses to the exchequer, including circular debt. After this, we proposed three short-term measures that can help improve ownership of issues across the sector. These are related to strengthening capacity at the regulatory and ministry levels including merging of the two energy sector ministries. Secondly, we proposed streamlining the pricing structure so that incentives for corruption can be minimized and finally we proposed the disengagement of the government from the DISCOs' tier so that transmission and distribution losses and recoveries of cash flow can be better managed by the private sector.

While we understand that such proposals were already known to the outgoing government, the incentive to move away from the status quo was weak. Therefore we have proposed a social accountability framework to be led by consumers and producers as clients in the energy sector.

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Notes

¹ Most of our examples relate to the power sector, however the arguments related to fragmented governance apply equally to the gas sector.

² Sub-sources include:

a) DISCOs Performance Statistics Reports FY 2005-2012 (for “total non-collections”).

b) USAID PDP Analysis based on data from NEPRA’s DISCO tariff determination 2012 (for “tariff determination and notification delay”). Data is only available for the year shown.

c) Data from MoWP— Tariff Cell (for “fuel price adjustments”). Data is only available for the two years shown.

d) Chief Engineer’s Office— MWP (for “difference between DISCOs’ TDS claims versus actual disbursed”).

e) USAID PDP Analysis (for “difference between DISCOs’ NEPRA-allowed versus actual transmission and distribution losses”).

³ These recommendations are derived from two recent research efforts at the Sustainable Development Policy Institute (SDPI) and largely focus on short- to medium-term measures that can be adopted.

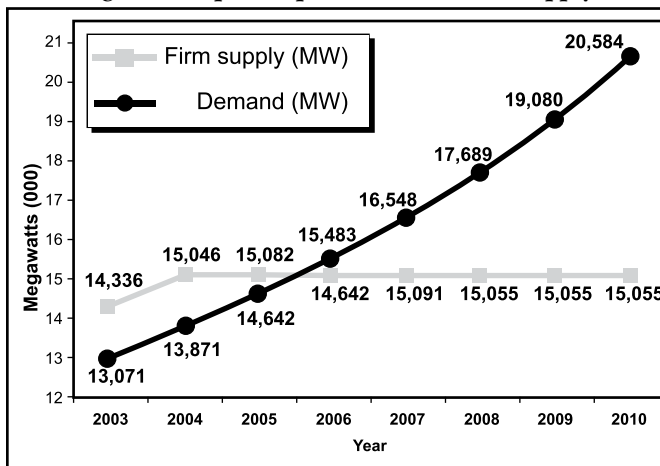
Revealing Facts: Energy Crisis and Renewable Energy Sources

power demand and supply is increasing drastically as shown in Figure 1.

Pakistan has been facing an energy crisis for a number of years. The gap between expected

Despite the consistent downwards trend of oil and gas supplies in Pakistan, maximum energy needs

Figure 1: Expected power demand and supply



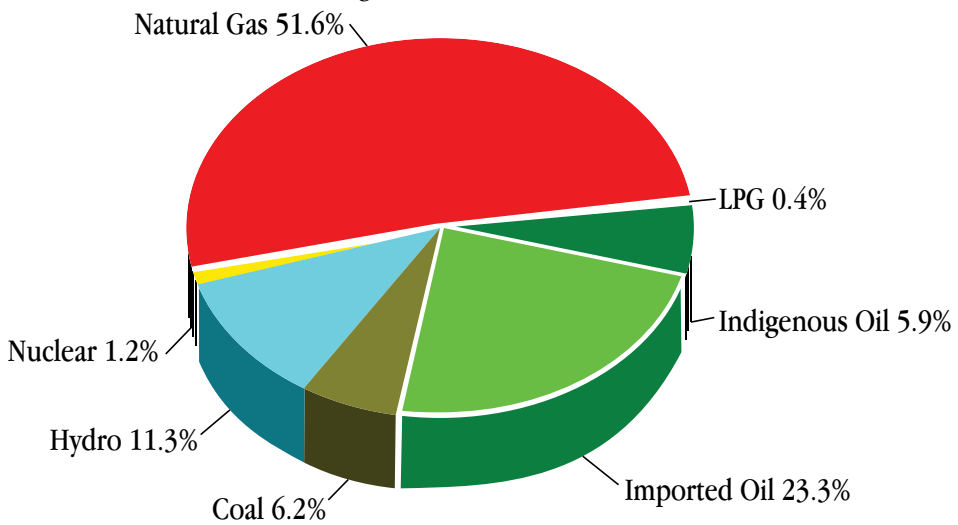
Source: Adapted from PPIB, 2006a . Retrieved from http://www.ppib.gov.pk/SupplyDemand_files/image002.gif

are still being met by petroleum and natural gas, with hydel and nuclear power a distant third and fourth, as shown in Figure 2. While there are many public and private power plants, the ever-escalating industrial, commercial and residential demands cannot be met without exploring other sources, especially renewable energy such as solar and wind power. While the infrastructural costs may be substantial, the long run benefits will outweigh the costs.

for solar power generation as shown in Figure. 3. Balochistan could lead holds eminence in prospective solar energy development due to its daily global insolation of 19 to 20 MJ/m² per day and annual daily mean sunshine duration of 8 to 8.5 hours as these values are among the highest in the world. Such development would not simply alleviate the energy crisis, but also development in these isolated and underdeveloped areas. Likewise the coastal terrain is ideal for wind power plants. Such alternative sources could not replace oil and gas as the primary energy sources, making them available for other uses such as raw material for the fertilizer industry.

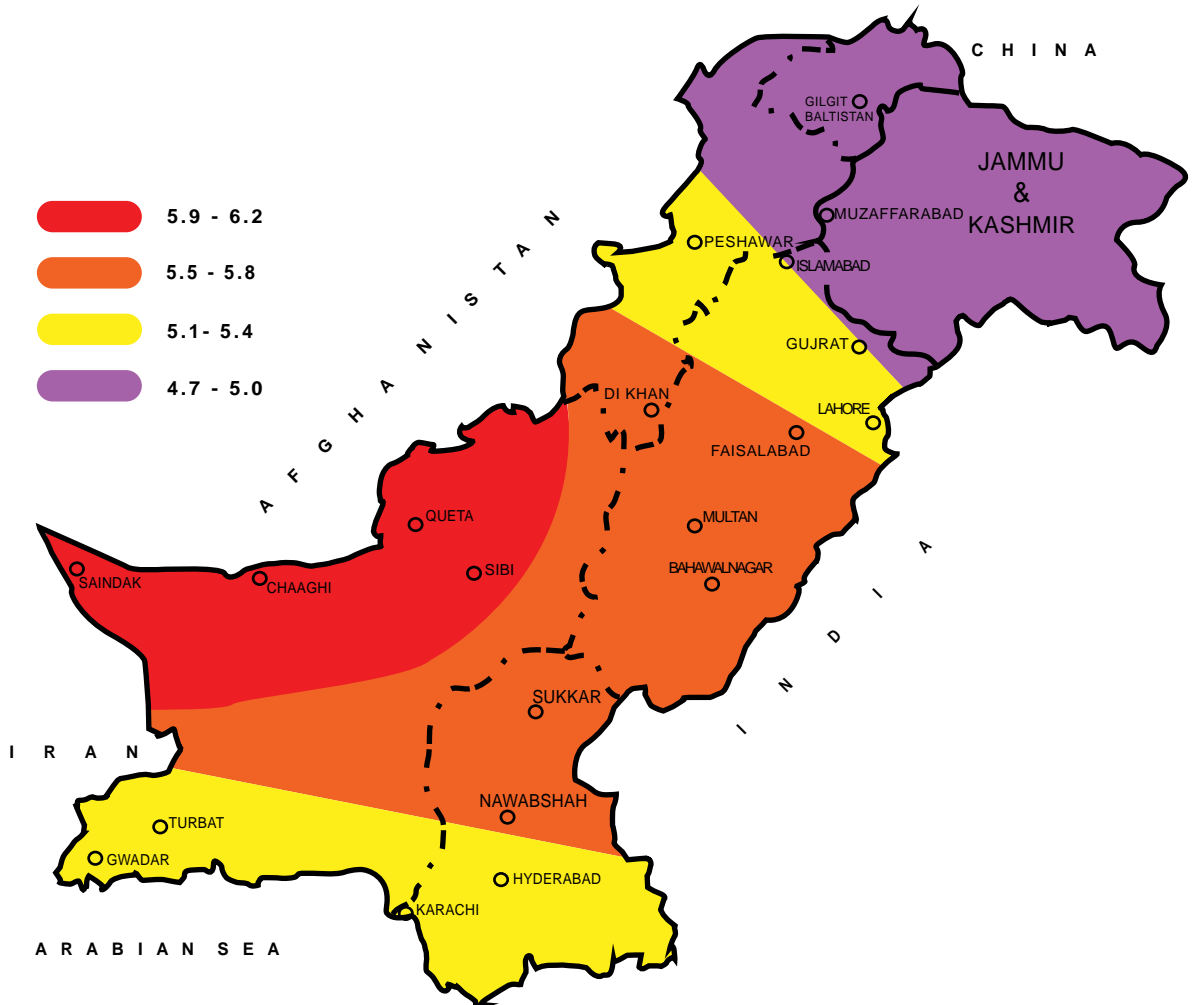
Pakistan has a belt of sunshine-rich districts due to not only long sunshine hours, but also high insolation levels, which could ideally be developed

Figure 2: Fossil fuel overview



Source: Ministry of Petroleum and Natural Resources, Pakistan (2005)

Figure 3: Annual average mean daily Solar Radiation in Pakistan



Source: Khalil. Muhammad Shahid., Khan, Nasim A., & Mirza, Irfan Afzal. *Renewable Energy in Pakistan: Status and Trends*, Alternative Energy Development Board (AEDB). Retrieved from <http://www.aedb.org/wind.htm>

Guidelines for Authors

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