For years, power distribution companies (DISCOMs) have been struggling to cope with the anarchy at rural feeders which heightens during the peak irrigation period, with both farmers and non-farmer community suffering alike. One of the ways to tackle this situation is to give more power hours to farmers during the peak season which a few companies do. While states like Gujarat and Punjab opted for feeder separation to improve rural power quality, West Bengal and Madhya Pradesh have resorted to giving temporary connections to farmers during peak irrigation period.

This paper analyses whether the temporary agricultural connections mitigate the anarchy during peak demand period and how. It also explores the potential usefulness of temporary farm power connections as a tool for groundwater demand management as well as for creating an alternative regime of metered farm power supply.

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HIGHLIGHT

Coping with Seasonal Peak in Power Demand for Irrigation

Pros and Cons of Temporary Farm Power Connections in Madhya Pradesh and West Bengal

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Coping With Seasonal Peak in Power Demand for Irrigation

Pros and Cons of Temporary Farm Power Connections in Madhya Pradesh and West Bengal[1,2]

Research Highlight Based on Banerjee (2011); Roy (2012); Singhania (2012)[3]

The bumper wheat crop in Madhya Pradesh in 2009, 2010 and 2011 suggests two drivers: the attractive wheat procurement prices (including a state government bonus over the support price declared by the central government) and the increase in the *rabi* irrigated area from 7 to 22 lakh[4] ha. The credit for this increase in irrigation goes not to the state's irrigation systems but to the electricity companies that have surpassed themselves in providing farmers temporary *rabi* season farm power connections. In 2011, the state's power distribution companies (DISCOMs) issued around 1 million *rabi* connections to meet peak season power demand for irrigation.

Madhya Pradesh and Gujarat experience this peak during *rabi*; Punjab and Haryana during *kharif*; and West Bengal during summer *boro* rice season.

During this period, farmers pull out all stops to secure, by fair means or foul, the electricity they need to power their pumps. Anarchy on rural feeders becomes frantic, power theft becomes rampant, transformers get overloaded, making life difficult for one and all. Gujarat and Punjab addressed this problem by separating the agricultural feeder from other feeders. Madhya Pradesh and West Bengal, on the other hand, have resorted to offering temporary, single-season farm power connections to cope with this seasonal increase in demand. At first sight, temporary connections may look like *jugaad*[5]; but there is more to them. An exploration of its impact suggests that this policy has resulted in large-scale productivity and equity benefits in the two states. As a permanent arrangement, the issue of temporary, single-season power connections should be evaluated for the uncommon economies they offer to power utilities and a powerful tool it presents for sustainable groundwater management.

Seasonality in agricultural power demand

In an IWMI-Tata Program (ITP) survey in 2010 of over 700 electric tube well owners in Gujarat, Rajasthan, Madhya Pradesh, Punjab, Tamil Nadu, Karnataka and Kerala, respondents were asked the average hours/day they operated their tube wells during the *kharif, rabi* and summer seasons[6]. Figure 1, based on farmers' responses, suggests that power demand for irrigation is highly seasonal, and this varies across states. Whereas the power demand in Punjab peaks during the *kharif* months, farmers in Madhya Pradesh and Gujarat use their tube wells most during the *rabi* irrigation. West Bengal farmers, not covered by the survey, need power to irrigate *boro* rice during summer. Seasonality is far less marked in Tamil Nadu, Karnataka and Kerala; but farmers in these states need more power for summer irrigation than during *kharif* and *rabi*.

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[1]This IWMI-Tata Highlight is based on research carried out under the IWMI-Tata Program (ITP) with additional support from the International Water Management Institute (IWMI), Colombo. It is not externally peer-reviewed and the views expressed are of the author/s alone and not of ITP or its funding partners – IWMI, Colombo and Sir Ratan Tata Trust (SRTT), Mumbai.

[2]This study would not have been possible without active support from Dr Mihir Shah, Member, Planning Commission, Government of India. The authors also acknowledge support from the managements of various DISCOMs as well as chief secretaries of the states covered.

[3]These reports are available on request from p.reghu@cgiar.org

[4]1 lakh = 0.1 million

[5]Jugaad in Hindi means a creative idea or a quick workaround to get through commercial, logistic or law issues. It is a quick alternate way to solve or fix complex or expensive problem. http://en.wikipedia.org/wiki/jugaad

[6]The survey was conducted by Mehul Srivastava and Uchit Maulesh Desai in Gujarat; Amaresh Sinha and Vaibhav Gupta in Madhya Pradesh; Rachna Rajput and Pushpenndra Saharan in Punjab; Roma Swami and Gaurav Jain in Rajasthan and Asha Eapen and Remya TP in Kerala. All these were IRMA student interns with the IWMI-Tata Program.

Figure 1 Seasonality in Agricultural Power Demand

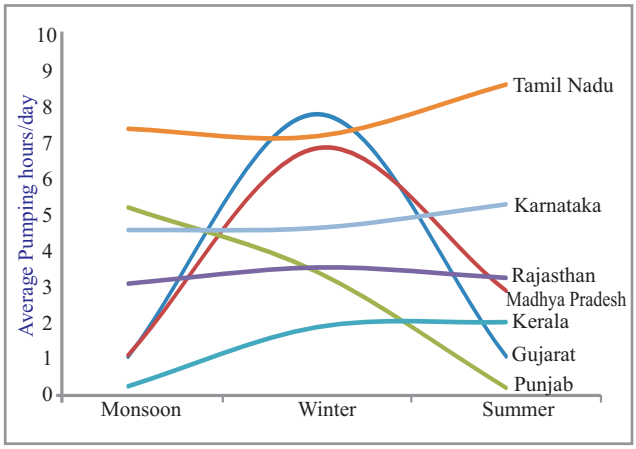
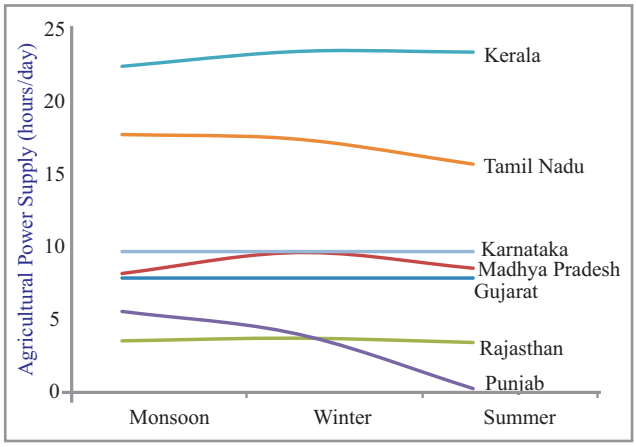


Figure 2 Seasonality in Agricultural Power Supply



Most DISCOMs ration the daily hours of power supplied to farmers; one way they deal with the seasonal hump is by increasing power hours during the peak season and reducing it during off-peak months. Figure 2 shows little evidence of DISCOMs managing power supply to match the demand pattern. Only in Punjab, there is some evidence to increase power supply during *kharif*, when demand peaks. In Madhya Pradesh too, the supply during *rabi* is somewhat higher than at other times. However, seasonal variations in the supply are far smaller than the demand. In Gujarat, farmers are supplied power for 8 hours per day, regardless of their irrigation needs. In Tamil Nadu, summer supply declines as demand peaks although farmers we sampled have little to complain about because they get power for many more hours than farmers elsewhere in Tamil Nadu.

It is during the peak irrigation season that farmer-induced anarchy on rural feeders is also at its peak. Every farmer owning electric tube well operates his pump whenever power is available. If timing of power supply is uncertain, use of auto-switches become common to start the pump as soon as power comes. If hours of power supply are insufficient, farmers replace small motors by larger ones, commonly without authorization. If getting a legal electricity connection is difficult, farmers - especially in far-flung villages - run their pumps all the same by hooking a line on the low tension cable. All these increase the load on the transformers, lead to frequent outages and voltage fluctuations, and often, to transformer burnout. The result is severe deterioration in rural power supply environment for domestic consumers, commercial consumers (shop keepers, schools, health centres etc.), Micro, Small and Medium Enterprises (MSMEs) and, of course, farmers themselves. These impacts have been analysed in another ITP Highlight (Nair and Shah 2012).

Ideally, farmers - like other consumers - should get 24x7 power and be charged on their metered consumption at a commercial rate. If the government wants to subsidize agriculture, the subsidy should be at the rate of per kWh consumed. However, given India's political economy of farm power subsidies, this can only work in the long run. In recent years, Madhya Pradesh and West Bengal have tried an alternative approach to dealing with the seasonal hump: of issuing temporary seasonal power connections to farmers. This Highlight offers a rapid preliminary assessment of this approach based on field explorations during 2010-12.

Temporary farm power connections in Madhya Pradesh

In Madhya Pradesh, where 80-90 percent of the power demand for irrigation is in the *rabi* season for wheat, DISCOMs struggle hard to bridge the demand-supply gap. During *kharif*, farmers grow rainfed crops, mostly soybean. In summer, small parcels of vegetables are irrigated mostly for home consumption. In winter every farmer in the state wants power to irrigate his wheat crop. Since under the prevailing subsidized flat tariff, farm power supply is a losing proposition for DISCOMs, they minimize the issue of permanent connections. In any case, the refusal of the DISCOMs to give a permanent connection to a point more than 150 ft away from a low tension (LT) line excludes a large number of farmers until such time as the distribution infrastructure is extended significantly. To top it, if the transformer capacity at the village is already fully utilized, giving more connections would only overload the system. Many farmers, however, worry little about overloading the system and freely hook lines on to power lines. In winter, such feeder-level anarchy reaches frantic proportions when farmers set aside all rules of the government and community-sanctioned norms of fair play to secure power for their pumps within the limited hours of supply. Those who hook on the LT lines in the hope of quick gains run the risk of a burnt transformer, leaving the entire village

power-less until such time as the transformer gets repaired/ replaced. Yet, the village community seldom does much to control or banish such thefts.

Partly to control rampant power theft and partly in response to local political pressure, DISCOMs in Madhya Pradesh have begun issuing temporary *rabi* power connections, in recent years. What does this mean for DISCOMs? For the economics of farm power supply? For farmers availing of such connections? And, of course, for the agricultural economy of Madhya Pradesh? To develop a first-cut assessment of this new trend, ITP deployed Shashank Singhania, an IRMA intern, to undertake a preliminary rapid assessment in Madhya Pradesh. Singhania visited all three DISCOMs, had discussions with officials as well as farmers, and accompanied vigilance squads on campaigns to nab power theft. His can, at best, be called a naturalistic enquiry; and his assessment, therefore must be taken as tentative.

Singhania found that in 2011, the DISCOMs issued nearly 1 million temporary connections. At a conservative 2 ha/connection, the power utilities created 2 million ha of additional irrigated area, more than the area that will be irrigated, for example, by Gujarat's Sardar Sarovar project which is under construction for 30 years and is likely to take at least another decade to complete at a likely total cost of Rs. 50000 crores[7]. Madhya Pradesh Chief Minister Shivraj Singh Chauhan takes pride that the state's irrigated area has increased from 0.7 to 2.2 million ha during his tenure because of drastic improvement in the management of public irrigation systems (Arun 2012). This increase - as also the boom in wheat production - likely has little to do with public irrigation projects and all to do with temporary farm power connections issued in 2009, 2010 and 2011.

The second interesting insight is that DISCOMs create this financially viable irrigation potential in quick-time. Temporary connections for 1 - 3 months are available on demand often within three days of application. These are not metered. However, the flat tariff these are subject to is computed on the assumption that these will run for an average of 6.6 hours/day and consume 155 kWh/HP per month priced at Rs. 4/kWh, a good 30 percent higher than what is charged to permanent connections. For a 5 HP temporary connection, the DISCOM bills 3100 kWh over 4 months, collects a total of Rs. 13855, of which the government subsidy is Rs. 5425 and the farmer pays Rs. 8430. The DISCOM thus earns Rs. 4.47/kWh, of which the farmer pays Rs. 2.72/kWh and the government pays Rs. 1.75/kWh. There is thus little, if any, power subsidy in these temporary connections, especially if we note that much of the farm power is delivered during off-peak periods. The three DISCOMs generated revenue of Rs. 400.60 crores from 9.57 lakh temporary connections in the winter of 2011, at an average of Rs. 4451/connection. This is collected in advance; temporary connections, therefore, also help DISCOMs improve their generally critical working capital situation.

The third interesting aspect is that DISCOMs in Madhya Pradesh manage temporary connections such that the distribution system can absorb the additional load in an orderly manner. The bottleneck is often the transformer capacity. Multiple hookings on to power lines are the common reason for transformer overload; DISCOMs,

Figure 3 Alternative modes of farm power distribution and

(A) Default option: LT lines distribute rationed power supply; rampant theft and anarchy-at-feeder, poor power supply for farmers and other users; high power subsidies and rampant groundwater overdraft (Madhya Pradesh now)

(B) Gujarat's Jyotigram feeder separation controls anarchy-at-jyotigram-feeder, theft and hooking continue on farm feeder, effective farm power rationing control subsidies and groundwater overdraft (MP is emulating this)

[7]1 crore = 10 million

a suggested pilot for Madhya Pradesh

(C) Gujarat's Khushy scheme HVDS with individual mini-transformers for farmers anarchy on farm feeder controlled; subsidies and groundwater depletion capped; but at a very high capital cost (MP is experimenting with this)

(D) Pilot project for Madhya Pradesh HVDS up to mid-sized metered transformers operated by farmer-franchises; LT power distribution through seasonal power connections; capital cost contained; franchisees pay metered charge and recover from irrigators

therefore, deliberately provide for some excess transformer capacity. As the demand for temporary connections grew, DISCOMs encouraged farmers to own their own transformers and farmer groups to rent larger transformers to support new temporary connections. Singhania (2012) argued that theft is likely to be better controlled when transformers are owned by farmers than by the DISCOM.

Government subsidies are structured to incentivize DISCOMs to convert temporary connections into permanent ones. However, the speed with which this can be done is determined by the pace of extension of distribution infrastructure. A new scheme, *Anudan Yojana*, provides farmers and government an option to share the cost of extending the distribution infrastructure.

As elsewhere, power sector policy makers in Madhya Pradesh too think that the ideal arrangement would be for farmers to be issued permanent metered connections and to be charged based on actual kWh consumed. When DISCOMs, therefore, tried metering tube wells, the farmers resisted the idea. In the HVDS pilot areas of Obedullagunj near Bhopal and Patan circle of Jabalpur, farmers disabled/damaged/tampered with meters, to continue to be charged a flat tariff. They were content to pay arbitrary flat tariff bills way higher than what the metered supply would cost but refused to have anything to do with meters. The oft-cited reason was the fear of being subjected in future of unbearably high metered charges. The farmers were attached to the certainty and predictability of flat tariff.

Singhania (2012) suggests billing farmers at flat tariff based on actual consumption metered at the transformer. Transformers are all metered and their readings regularly taken. Transformer meters are also hard to tamper with. DISCOMs have an accurate idea of power consumption at the transformer level. What is needed is an easy system for sharing the cost of power used by farmers and billed at the transformer. An alternative scheme we would like to suggest is to actively invite farmers to own transformers and make them concessionaires of the DISCOM. These concessionaires provide temporary connections to other farmers and supply power to them through their transformers at mutually agreed terms but pay to the DISCOM based on metered power consumption at the transformer (less a discount for saving substantial transaction-cost for the DISCOM of metered power supply directly to farmers). The Eastern Madhya Pradesh DISCOM has some 48000 agricultural transformers and over a million tube well connections. Managing metered tariff on 48000 transformers would be a great deal easier than for a million dispersed tube wells.

Temporary *boro* season connections in West Bengal

West Bengal is another Indian state which has experimented with temporary farm power connections to respond to the seasonal hump in power demand for irrigation. So far in 2012, West Bengal has issued some 35000 temporary connections (Figure 4). This number looks small compared to Madhya Pradesh's 9.6 lakhs; however, it is nearly 25 percent of West Bengal's 1.24 lakh permanent connections. Moreover, temporary connections may have enabled *boro* rice cultivation on around 2.5 - 3 lakh ha in West Bengal in 2012. These were issued from domestic transformers for a fixed period of

105 days in summer within 14 days of applying. Metered temporary connections - 65 percent of all temporary connections - are charged for at Rs. 3.09/kWh of power, higher than Rs. 2.73/kWh levied on permanent connections. Applicants pay Rs. 16000 in advance towards security deposit and connection charge. At the time of disconnection, the utility deducts the actual power charges and settles the balance either way.

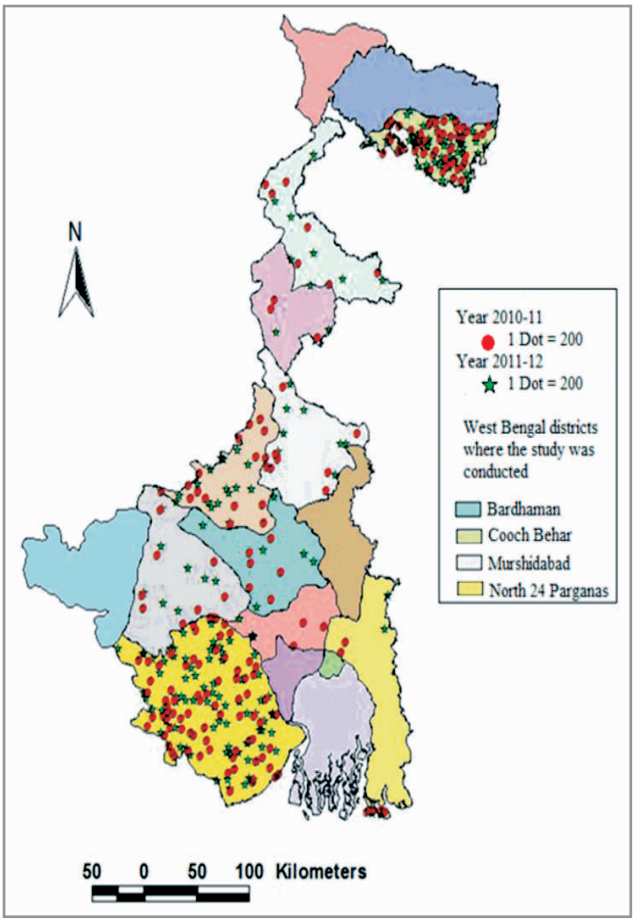
To understand the wider impact of temporary connections on power utility, farmers and agriculture, ITP deployed Partha Sarathi Banerjee, a senior researcher and Ayan Roy, an IRMA intern to independently do a rapid assessment. Banerjee (2011) explored 13 villages in North 24 Parganas and Bardhaman. Roy interviewed scores of power utility staff and farmers in Murshidabad, Cooch Behar, North 24 Parganas and Bardhaman.

Farm power demand in West Bengal experiences a sharp increase during 100 days of the pre-summer *boro* rice season. After decades of stagnation, West Bengal's agriculture experienced a sudden jump in the growth rate of grain output from 2.5 percent/year before 1980 to 5.8 percent/year during the 1980s owing to the shallow tube well revolution. Shallow tube well irrigation led to major expansion in the area under *boro* rice cultivation. Being intensively irrigated, *boro* rice enabled farmers to make use of fertilizers and high-yielding rice varieties, and achieve relatively high yields. However, gains from this belated Green Revolution began to peter out around 1995. Shallow tube well irrigation was attractive when diesel prices were low. However, as diesel prices soared from Rs. 3.54/litre in 1990 to Rs. 49/litre in 2012, *boro* cultivation lost its shine. Electricity now became a favoured energy to drive irrigation pumps. But it is not easily available; thus, the *boro* rice cultivation area has been shrinking. It dwindled by 2.8 lakh ha in 2012. Against a target of 14 lakh ha, the actual *boro* area was 13.6 lakh ha in 2009-10, 12.5 lakh ha in 2010-11 and 11.2 lakh ha in 2011-12 (Sarkar 2012).

The electricity-groundwater nexus has, however, played out differently in West Bengal. When other states were surpassing each other in doling out free power, West Bengal abolished flat tariff in the early years of the new millennium, installed sophisticated electronic meters on tube wells and introduced a time-of-the-day metered tariff for farmers who, like other consumer segments, were provided access to 24x7 power supply. Because farmers were full-fee paying consumers, the number of electric connections should have rapidly increased. However, for the fear of accelerated groundwater depletion and arsenic contamination of drinking water, an over-cautious State Water Investigation Department (SWID) restricted the issue of groundwater permits to farmers; the permit is needed before electricity connections can be issued. This did not stop the proliferation of diesel 'shallows', the numbers of which rose rapidly; but it reduced the profitability of *boro* rice cultivation.

In pockets where water levels in the *boro* season dropped below 8 m, however, diesel pumps became infeasible or prohibitively costly to run; and farmers had no alternative to electric submersible pumps. It is mostly in these parts that the area under *boro* rice fell precipitously. Out of frustration - and often with support from local politicians - power theft increased during the *boro* season. In Raghunathganj in Murshidabad, Roy (2012) found the aggregate technical and commercial (AT&C) losses high at 58 percent; in Katwa, Bardhaman, it was 53 percent. The demand for temporary connections here is high; if denied, farmers will steal power anyway; despite the prohibitive penalty levied for power theft.

Figure 4 Number of temporary connections in West Bengal during 2010-11 and 2011-12



Temporary connections - usually drawn using bamboo poles, with wires over the fields - are cheap, quick but messy and risky. But Banerjee as well as Roy found them practical and helpful to farmers. The most interesting insight from the Banerjee-Roy exploration is that temporary farm power connection has been a response to multiple challenges: it has spared the power utility and the farmer the huge cost - Rs. 1.5-2 lakhs on an average - of extending distribution infrastructure to provide new permanent connections. Since a SWID permit is not needed for temporary connections, it has neutralized SWID's power to check electrification of tube wells. It has helped control theft. In districts such as Bardhaman, temporary connections have helped the utility staff cope with enormous political pressure from local notables under the previous government.

Of the 13 villages covered by Banerjee, 7 had no permanent farm connections; the remaining 6 villages had 30 permanent connections to serve 2920 ha. Temporary connections are typically issued in areas where demand is very strong but the power utility cannot grow distribution network fast enough to meet it. Moreover, 12 of Banerjee's 13 villages were 'submersible' villages. Even if large diesel pumps were used to power submersible pumps with belts, its use in *boro* rice irrigation would be prohibitively expensive.

In Madhya Pradesh, adequate transformer capacity is ensured before new temporary connections are issued; in West Bengal, this is not so. Temporary connections overloaded the transformer, resulting in perennial low voltage and occasional transformer burnouts in the 13 villages covered by Banerjee. Although people complained, they understood because almost every household was a beneficiary. In a few villages, however, public pressure led to voluntary restrictions on pump operation during peak hours.

Banerjee and Roy independently noted the strong connect between temporary connections and local water markets. Temporary connections are intensively utilised during the 105 days they are made available. Seekers of temporary connections are basically farmer-entrepreneurs interested more in selling pump irrigation service for a price than in irrigating their own fields. Roy noted that almost all operators of temporary connections were basically Irrigation Service Providers (ISPs) and had very small plots of their own under irrigation; nine-tenths of the *boro* or vegetable area they served belonged to water buyers. Six such ISPs that Roy interviewed in Hoogli, Bardhaman, Cooch Behar, Murshidabad and North 24 Parganas irrigated only 13 acres of their own land but sold irrigation service for 158 acres. In some cases, ISPs also leased in land for cultivation. ISPs sold water at a flat rate of Rs. 2500-3750/acre of *boro* rice or at an hourly rate that varied from Rs. 40-50. ISPs irrigated mostly rice in Bardhaman, and vegetables and cash crops in North 24 Parganas. For vegetables, irrigation was invariably sold on an hourly basis and at a much higher price of Rs. 80-100/hour. Some two-thirds of the temporary connection operating ISPs in West Bengal have metered connections and pay for power based on consumption.

Banerjee and Roy both assert that at the prevailing terms of business, temporary connections offer a win-win deal to both the ISPs as well as their buyers. This is especially so for temporary connections on flat tariff. Temporary connections are also pro-poor. Many landless people lease land from large land owners during the *boro* season to use their family labour and grow the family's annual requirement of rice. If the buyers were to use diesel pumps, irrigating an acre of *boro* rice would cost them 2.5 to 3 times what they pay the ISP. By irrigating 25-30 acres with his temporary connection, the ISP is also able to earn a profit after paying for the metered power tariff.

The 'temporary connection regime' in West Bengal, however, is all set to change. A new administrative order has abolished the need for a SWID permit in all blocks except the 'dark' and the 'over-exploited'[8]. It has also mandated the power company to provide permanent connection to farmers at an installation fee of Rs. 10000, when the actual cost may be 10-15 times as much.

Conclusion

From the viewpoint of agricultural groundwater management, temporary connections have the great advantage that their number as well as their owners can be changed on an annual basis. Permanent tube well connections, once issued, are hard to withdraw; moreover, it makes the local groundwater political-economy 'path dependent'. As water levels go down, permanent connection owners raise the demand for larger pumps and power subsidies. Temporary connections are issued only during times of peak irrigation demand for a fixed period when farmers are concerned about getting power at all, never mind the subsidy. Temporary connections leave room for reworking the terms, pump size, number of connections, etc in a manner that can promote sustainable groundwater management. Permanent power connections allocate in *de facto* terms, permanent groundwater rights

[8] 'Dark' areas are those where over 85 percent of known annually replenishable ground water resource is developed. In 'over-exploited' areas development exceeds 100 percent of known annually replenishable resource.

to early exploiters for all times to come. Temporary connections can facilitate reallocation of *de facto* groundwater rights on an annual basis and break the monopoly of early entrants. When the demand for power for irrigation is highly seasonal, temporary connections can be part of an entirely new pattern of farm power supply. Permanent connections are also costly to lay. Gujarat recently planned to offer 1 lakh new permanent connections at a capital cost of Rs. 1500 crores, at an average of Rs. 1.5 lakhs per connection (Shah 2012). If Madhya Pradesh were to convert its 1 million temporary connections into permanent ones, the state's DISCOMs will have to find Rs. 15000 crores which, if invested in augmenting generation or in HVDS, can possibly be of much larger benefit. This part of the distribution infrastructure will also remain perennially underutilised, for just a few months every year. With temporary connections shaving off the seasonal hump in power demand, DISCOMs need to invest only in distribution infrastructure needed for round-the-year consumers (Table 1).

Our explorations in Madhya Pradesh and West Bengal establish that:

1. Thousands of farmers pay commercial charges for the power they badly need during peak irrigation seasons in both the states.
2. Farmers are willing to create and pay for a temporary power supply network.
3. In West Bengal, 65 percent of the 35000 ISPs with temporary connections pay for power on a metered basis at a commercial rate and recover irrigation charges mostly at flat acre based charges from their multiple customers.
4. Anarchy and theft are minimized on components of infrastructure owned and managed by farmers/ISPs.
5. By far, the largest proportion of power sector losses from agricultural supply business and of groundwater withdrawal occur during the peak irrigation season; it needs a specialised management regime distinct from customers who need steady power all through the year.
6. Extending power distribution infrastructure to cater to seasonal demand is inefficient and costly.

Table 1 Pros and Cons of Permanent and Temporary Farm Power Connections

	Permanent farm power connection	**Temporary, seasonal farm power connection**
Capital cost to the DISCOM/LT connection	Rs 1.5-2.0 lakh	Rs 5000-10000
Capital cost to the DISCOM/HVDS connection with individual transformer a la Gujarat's KHUSHY scheme	Rs 2-35 lakh	
Capital cost to the DISCOM/HVDS to Irrigation Power Providers (IrrPPs) with LT temporary connection (as per proposed pilot)		Rs. 40000-50000
Waiting time for a permanent connection	6 months-10 years	1-15 days
De - facto groundwater use right	Permanent	Single season
Risks of tube well owners forming into a powerful interest group	High	Low-medium
Ease of varying groundwater abstraction according to resource availability across time and space	Limited	High
DISCOM's ease of collecting cost-to-serve farm power from farmers	Low	High, because these deliver power during peak irrigation season

Imagine the 35000 ISPs of West Bengal invited to invest in or rent transformers as in Madhya Pradesh to operate as IrrPPs. Each transformer is metered (as tube wells are in West Bengal) and is connected to an HVDS line. During the peak irrigation season, IrrPPs are allowed to offer temporary connections to farmers up to a limit set by the capacity of their transformer. They pay to the power company based on metered billing on the transformer. The IrrPPs recover power costs from their customers either by charging on a per acre basis, on per hour of power drawn (as ISPs do in West Bengal) or on metered use. The advantages such an institutional arrangement can offer are many: [a] at the transformer level and above, energy accounting can be established; [b] because the IrrPPs are to pay the metered charge, all drawbacks of flat tariff can be substantially overcome; [c] the transformers are privately owned and operated; therefore, anarchy and theft will be controlled by the IrrPPs themselves; [d] peak season groundwater withdrawals can be controlled by limiting the number of transformer concessions issued on an annual basis;

[e] DISCOMs will be spared the massive capital investment of extending the distribution infrastructure that will always remain underutilised. Such an institutional arrangement already exists in many parts of China where village electricians are incentivised to work as electricity providers (Shah et al. 2004).

For states such as Punjab and Gujarat, where electrification of agricultural pump sets has been largely completed, temporary farm power connections offer little appeal, except during a drought. However, for states such as Madhya Pradesh, West Bengal, Bihar and others, where pump electrification is yet to gather momentum, the pros and cons of temporary connections deserve to be carefully examined from the viewpoint of the economics of farm power supply as well as of sustainable groundwater management. Temporary farm power connections are widely considered a transitional phase to give way to permanent connections; but they need to be studied for the permanent benefits they can potentially offer.

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About the IWMI-Tata Program and Water Policy Highlights

The IWMI-Tata Water Policy Program (ITP) was launched in 2000 as a co-equal partnership between the International Water Management Institute (IWMI), Colombo and Sir Ratan Tata Trust (SRTT), Mumbai. The program presents new perspectives and practical solutions derived from the wealth of research done in India on water resource management. Its objective is to help policy makers at the central, state and local levels address their water challenges – in areas such as sustainable groundwater management, water scarcity, and rural poverty – by translating research findings into practical policy recommendations. Through this program, IWMI collaborates with a range of partners across India to identify, analyze and document relevant water-management approaches and current practices. These practices are assessed and synthesized for maximum policy impact in the series on Water Policy Highlights and IWMI-Tata Comments.

Water Policy Highlights are pre-publication discussion papers developed primarily as the basis for discussion during ITP's Annual Partners' Meet. The research underlying these Highlights was funded with support from IWMI, Colombo and SRTT, Mumbai. However, the Highlights are not externally peer-reviewed and the views expressed are of the author/s alone and not of ITP or either of its funding partners.

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