

Power Tariff Policy for Groundwater Regulation: Efficiency, Equity and Sustainability

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In the recent years, increasing importance is being given to the study of the influence of power tariff policy on the groundwater use and exploitation as the existing regulations relating to groundwater exploitation could not make desirable impact. It is argued that appropriate power tariff policy can be used as a tool to control the over-exploitation of groundwater and consumption of electricity. In this context, this paper critically evaluates how effective is power tariff policy as an instrument for groundwater regulation and power utilisation based on theoretical reasoning and practical considerations. The paper concludes that the tariff policy can be an effective tool only if combined with other policy.

Introduction

Power tariff policy is frequently advocated as a mean to influence the groundwater use and withdrawal decisions of farmers (e.g., Shah, 1993). This suggestion is gaining in importance in recent years in view of the complete failure of existing well-spacing regulations implemented through credit and power connection policies and the supposed impossibility of instituting an enforceable property rights system in groundwater (Saleth, 1996). The main objective of this paper is to critically evaluate how effective is power tariff policy as an instrument of groundwater regulation based essentially on theoretical reasoning and practical considerations. In particular, it is aimed to demonstrate that the nature and magnitude of sustainability, efficiency, and equity effects of power tariff policy depend crucially on the nature and shape of the power demand curve, both individual and aggregate, that links power tariff and power consumption on the one hand and power consumption and groundwater withdrawal¹ on the other hand.

Rationale for Power Tariff as a Policy Instrument

The rationale for proposing power tariff as a tool for influencing groundwater withdrawal and use stems from the fact that the demand curve for power is continuous and presumably, its shape is convex throughout its entire range. Unfortunately, this assumption appears to be suspect at least for the following two reasons.

Firstly, the power demand curve is not continuous throughout its range but actually has a "kink", the exact position of which is determined, among other things, by a combination of economic, agronomic, hydrological, and even, technological factors².

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¹ Since electric powered pumpsets are also used to lift water from surface water bodies like river, ponds, etc., surface water withdrawals could also be influenced by power tariff changes. To this extent, most of our arguments advanced in the context of the relationship between power tariff and groundwater withdrawal could also be generalised to the context of the relationship between power tariff and lift-based surface water withdrawal.

² Since these factors do not allow farmers to use power up to the point where its marginal cost and marginal value
(contd.)