Do all the wet geothermal systems represent natural EGS in India?

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India's Power Status and CO_2 emission

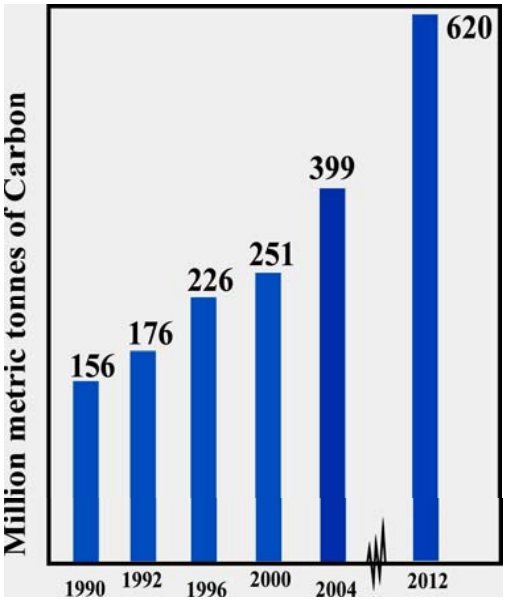
- **Present Production:** 1,23,668 MWe
- **IPP's contribution:** 10,000 MWe

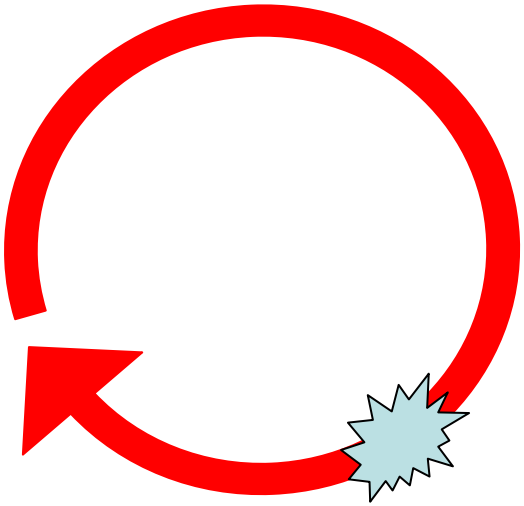
Plant/Fuel Type		MWe		Percentage	
Thermal		82,065		66.4	
	Coal		68,434		55.5
	Gas		12,430		10.0
	Oil		1,201		0.9
Hydro		32,135		26.0	
Nuclear		3,310		2.7	
Renewable		6,158		4.9	
Total		1,23,668			

- **Expected Production by 2012:** 2,15,000 MWe
- **Projected increase in:** 91,332 MWe
- **Growth in 2007-08:** 4.6%

870 million tones of CO_2 will be produced by this coal (~8 % /Year)

263 Million tones of coal will be burnt to achieve the target





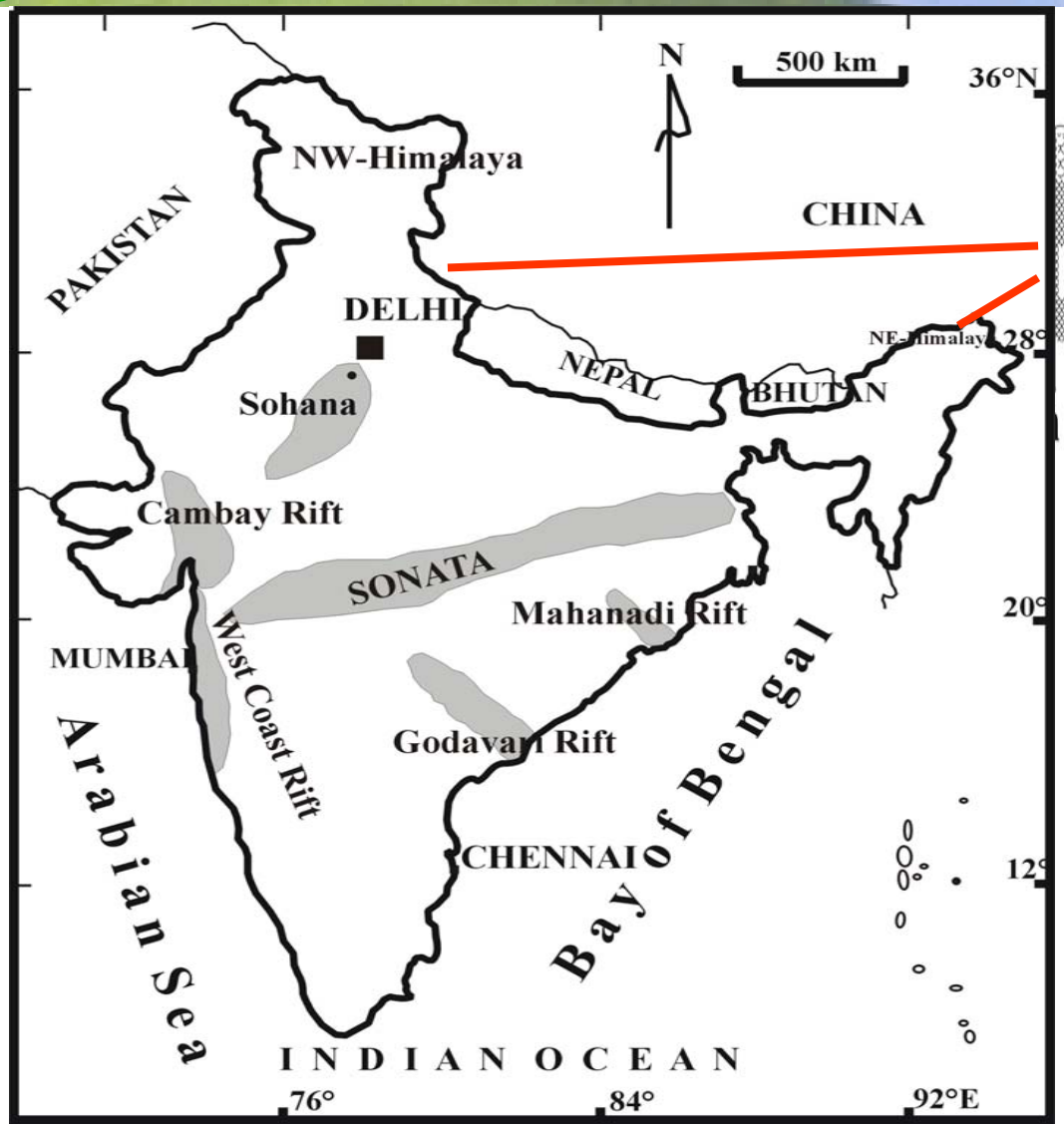
UNFCC CO_2 cap Forces India to reduce CO_2 emission by 5%

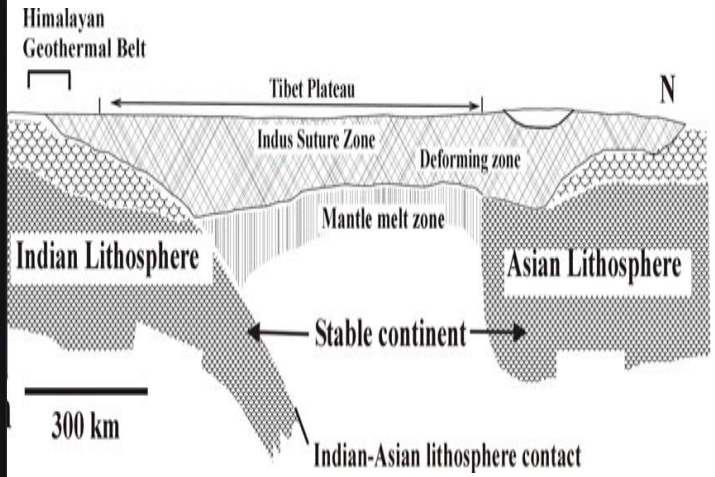
India has to enter carbon Trade with EU countries

Options

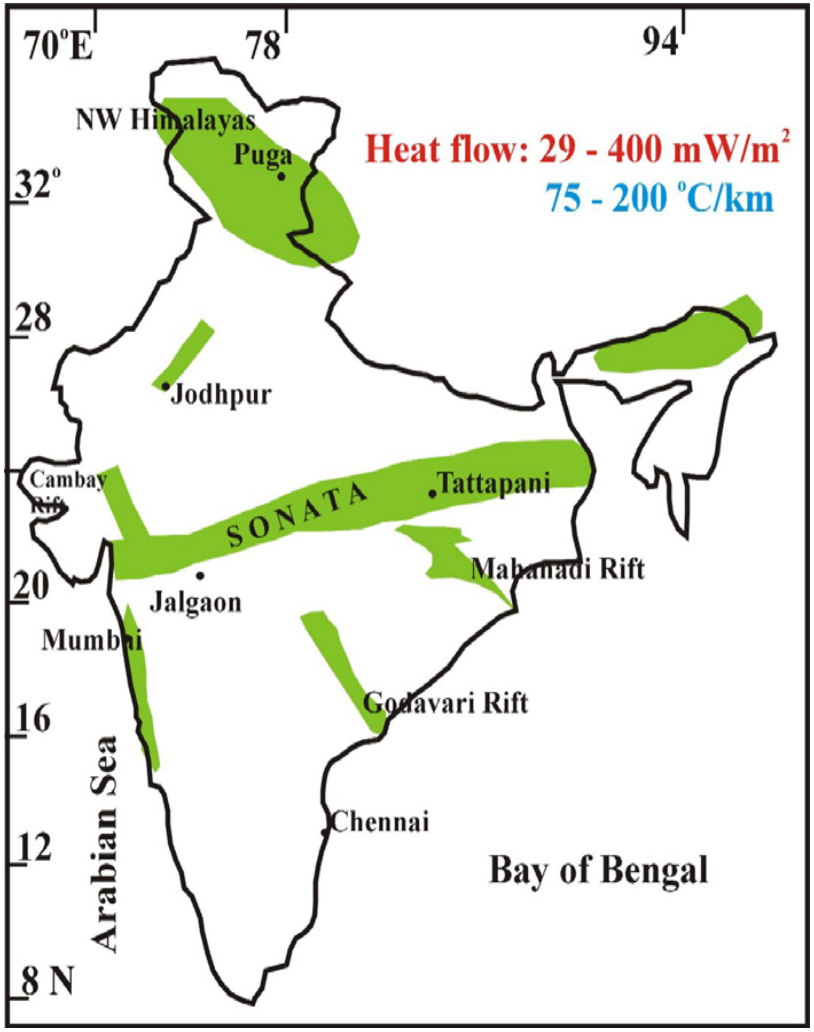
Wind: x
Solar: x
Bio: x
Hydel: x
Geothermal:

Geothermal Provinces and associated tectonics

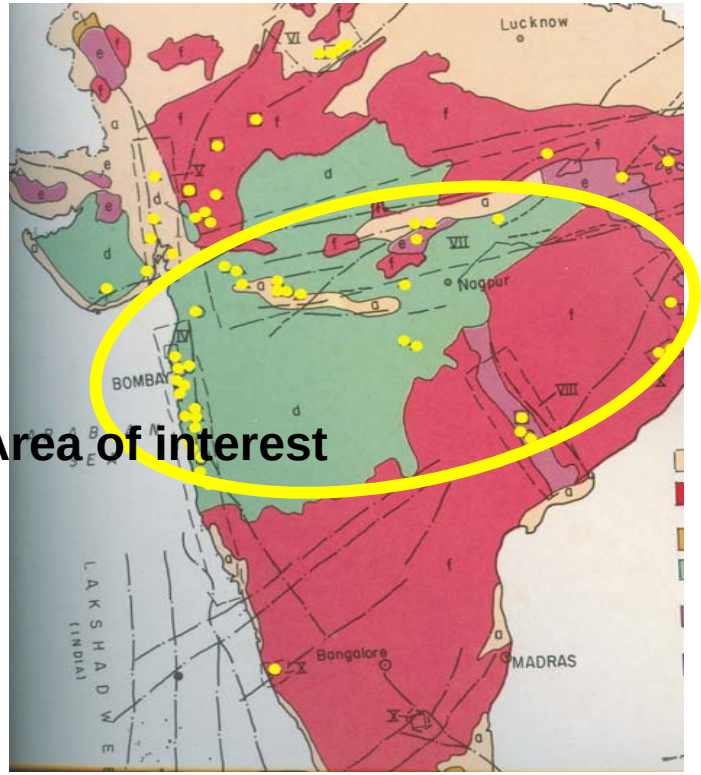




Indian Thermal Provinces



Heat flow & Geothermal gradient of Indian Provinces

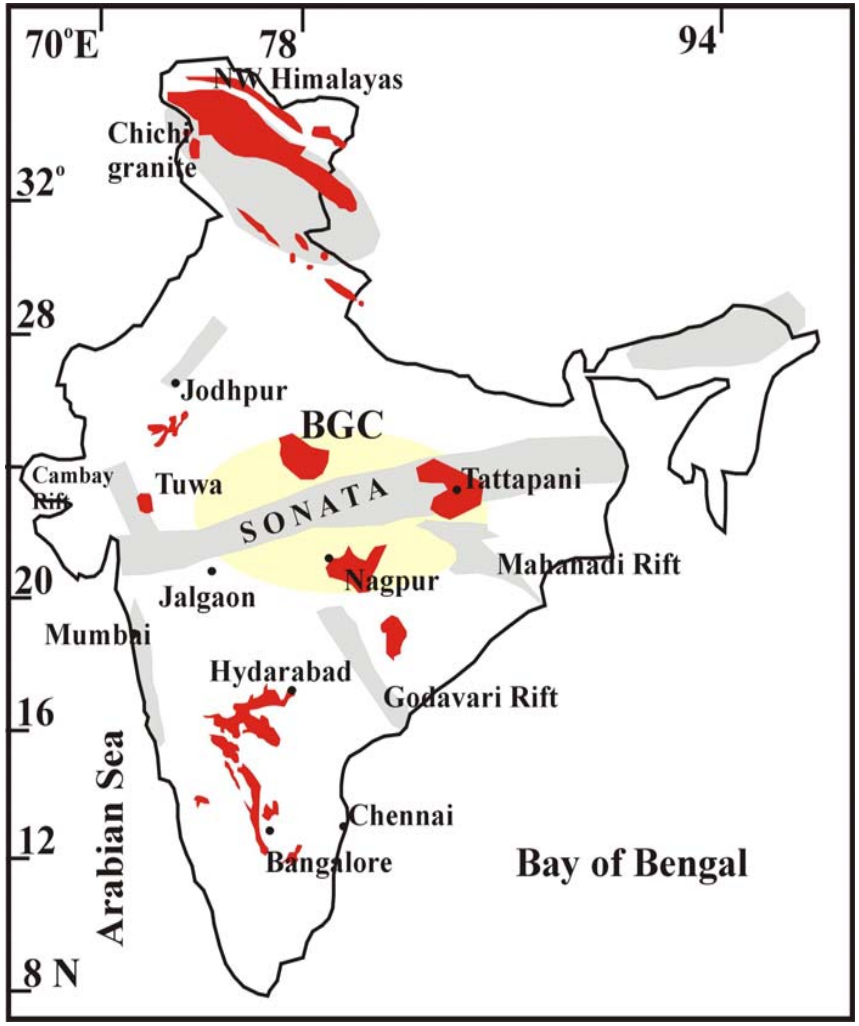


Area of interest

Source: GSI Atlas

Characteristics of geothermal Province

Surface exposure of granites

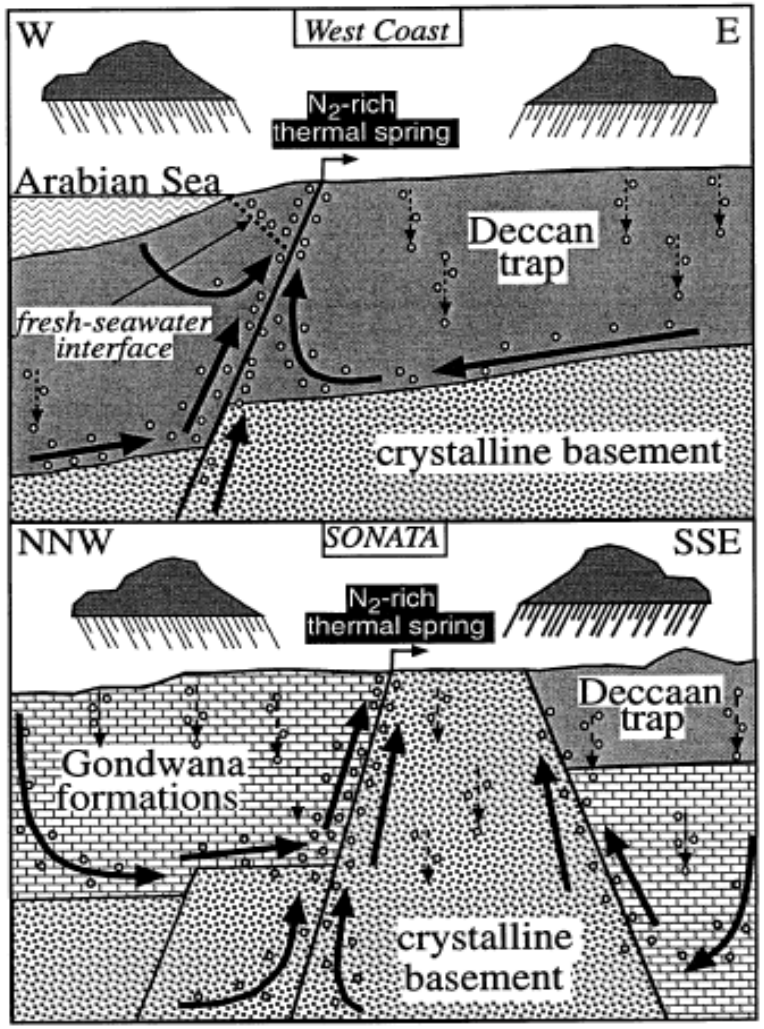


Fluoride 2-39 ppm
CO_2: < 2 % by volume
He: 6-9 %
N: > 90 %
These values do not support any magmatic sources

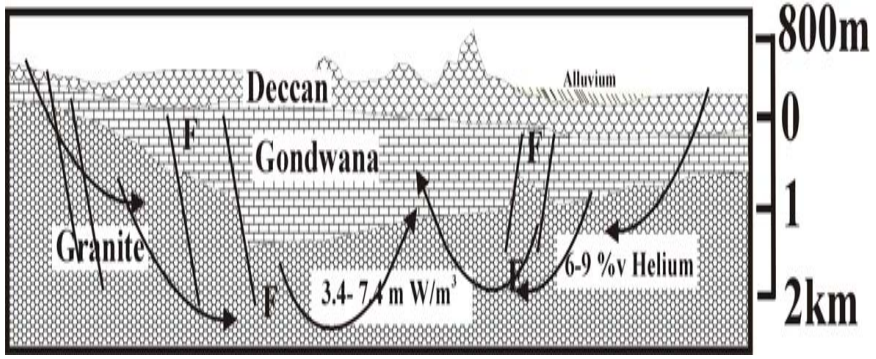
However, the geothermal provinces are located within the domain of High heat generating granites. Occurrence of granite is reported below the Deccan basalt flows also.

- **Heat generation: 3.4 to 7.4 μWm^{-3}**
- **Heat flow value: 67 - 120 mW/m^2**
- **Crustal Circulation of thermal fluids: ~ 2 km depth**
- **Surface fluids temperature: 35 - 98 °C**
- **Geo-thermometry: 150 - 210 °C**

Circulation pattern of thermal waters

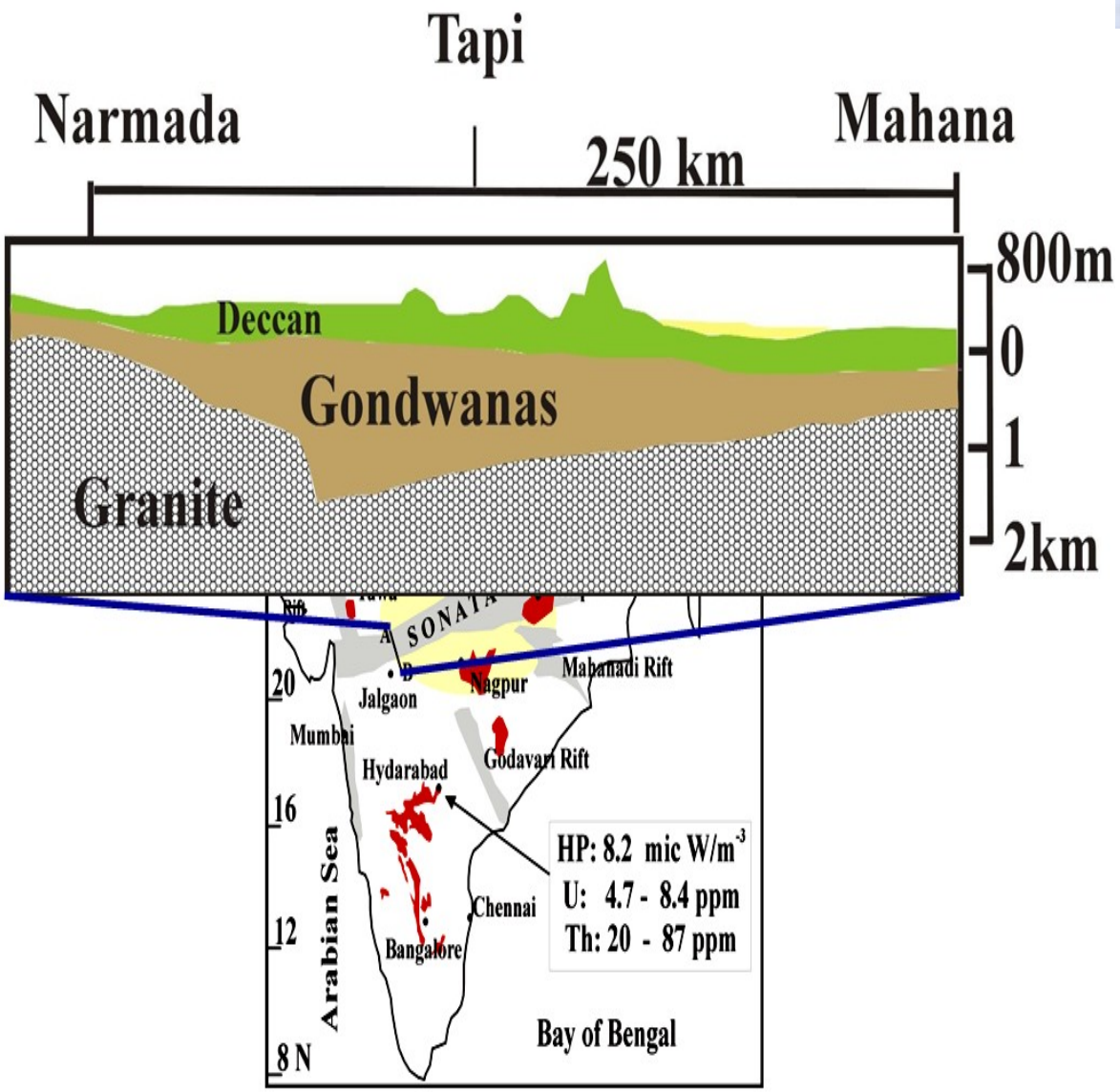


A. Minissale, O. Vaselli, D. Chandrasekharam, G. Magro, F. Tassi, A. Casiglia, *EPSL, 181, 2000*

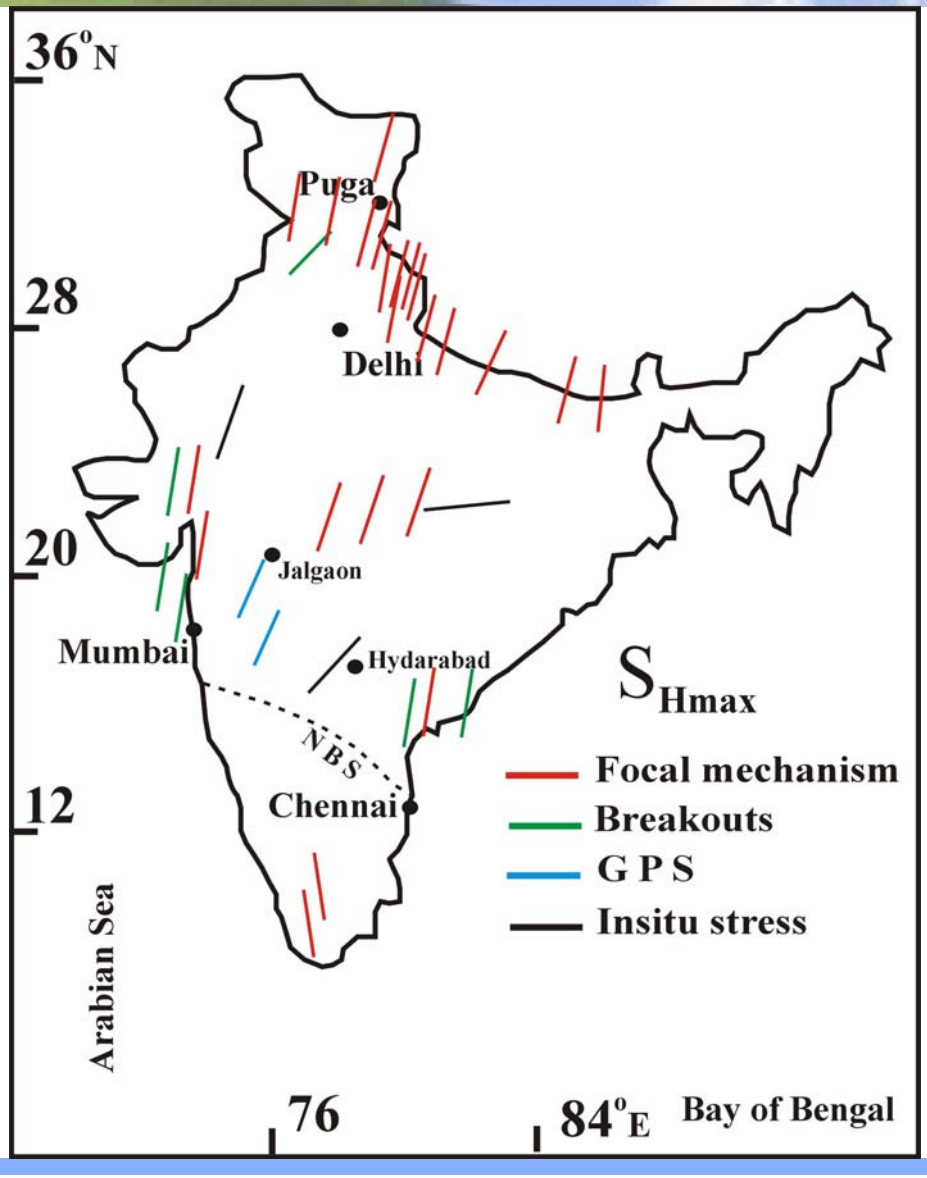


Thus the high heat generating granites with interconnected fractures, below thick insulating sediments, are driving the wet geothermal systems associated with continental rifts. In the case of geothermal systems within the Himalayan geothermal belt, presence of mantle helium indicates involvement of mantle component in the evolution of these thermal springs.

Sub-surface geology of NE Deccan Province



Stress pattern of India

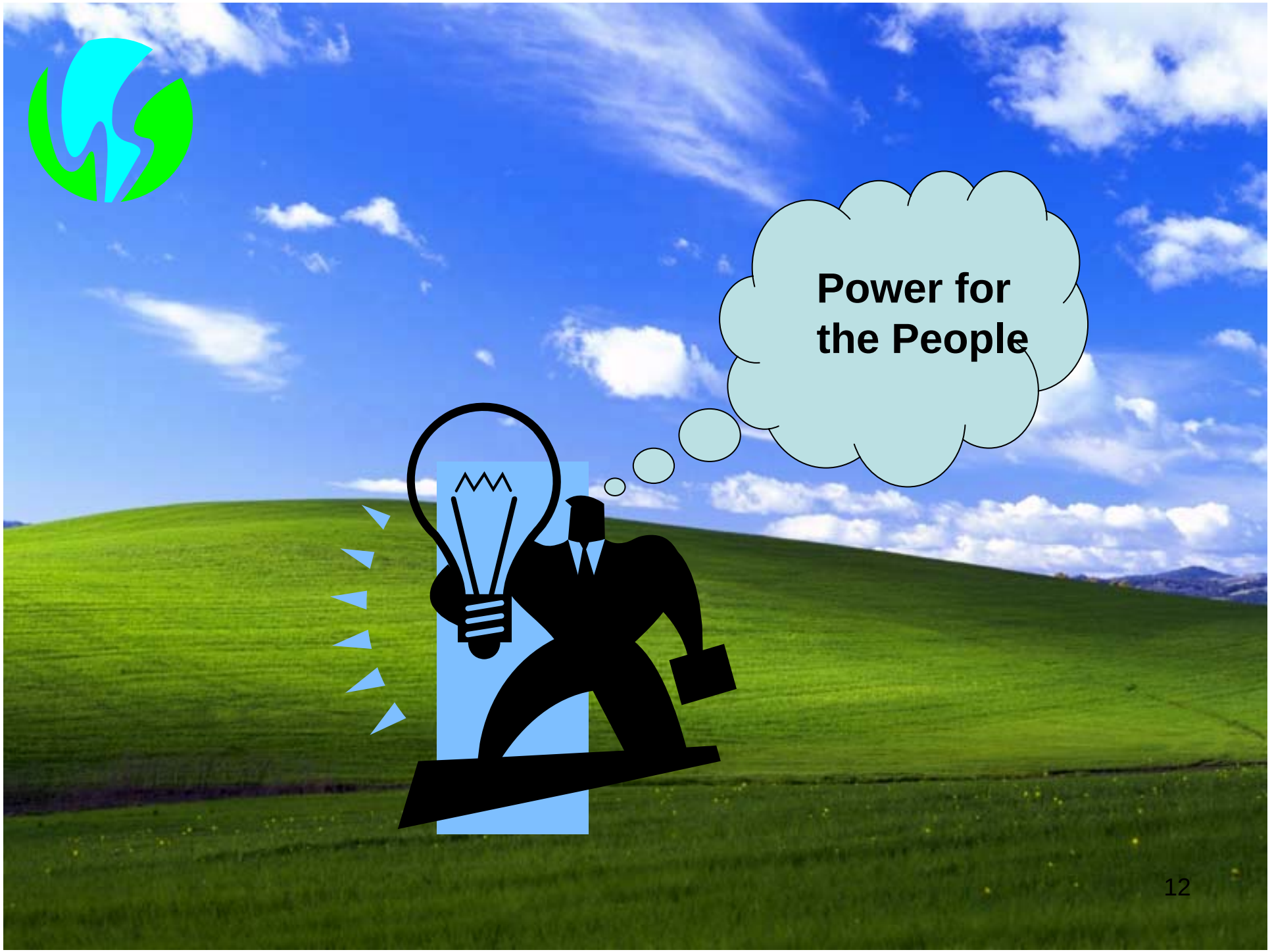


Indian Power Tarrifs

SHOCKING TARIFF

	Business	Households
India	26.13	14.77
US	5.00	9.60
Japan	12.72	19.63
China	5.00	6.90
France	4.80	13.60
UK	10.00	11.94

(All prices in US cents) Source: IEA


Power for
the People