Feb 26, 2012


Pakistan Tehreek-e-Insaf
Policy Seminar
Series
Energy
From Crisis to
Solutions
Pakistan
Tehreek-e-Insaf
vows to rid the
country of its
Energy Crisis with
diligent planning,
effective policy
and efficient
management for
a self reliant and
economically
stable Pakistan.

The Diagnosis

Key reasons behind current and previous energy crises:

1. Lack of long-term integrated planning and implementation for last 40 years
2. Ignored indigenous resources
3. Dependence on imported furnace oil
4. Lack of political will to reform / deregulate

1. Lack of long-term integrated planning

- 1994 Power Policy a **late response** to chronic shortages
- 1994 Policy added 6,000 MW of **mostly imported thermal** between 1997-2001
  - Thermal share increased from 30% to 70%
  - Led to expensive surplus capacity by early 2000s
- Surplus bred **complacency**
  - Political witch-hunt in late 90s drove away investors
  - Electricity demand jumped to 10% p.a. between 2004-07
- As a **late, knee-jerk response**, a new wave of IPPs approved between 2004-07

1. Lack of long-term integrated planning (cont'd)

- 3,700 MW new capacity came online in 2007-11
  - Again, based on furnace oil
    - Or gas that was not available
- Rental Power Plants fiasco due to short-term measures
  - 100 MW being produced vs. 2,000+ MW planned
  - One of the few RPPs online charging Rs. 43 / kWh
- As a result, in the last four years…
  - Tariff has almost doubled
  - Rs. 1 trillion spent on subsidies
  - And there is still no solution in sight…

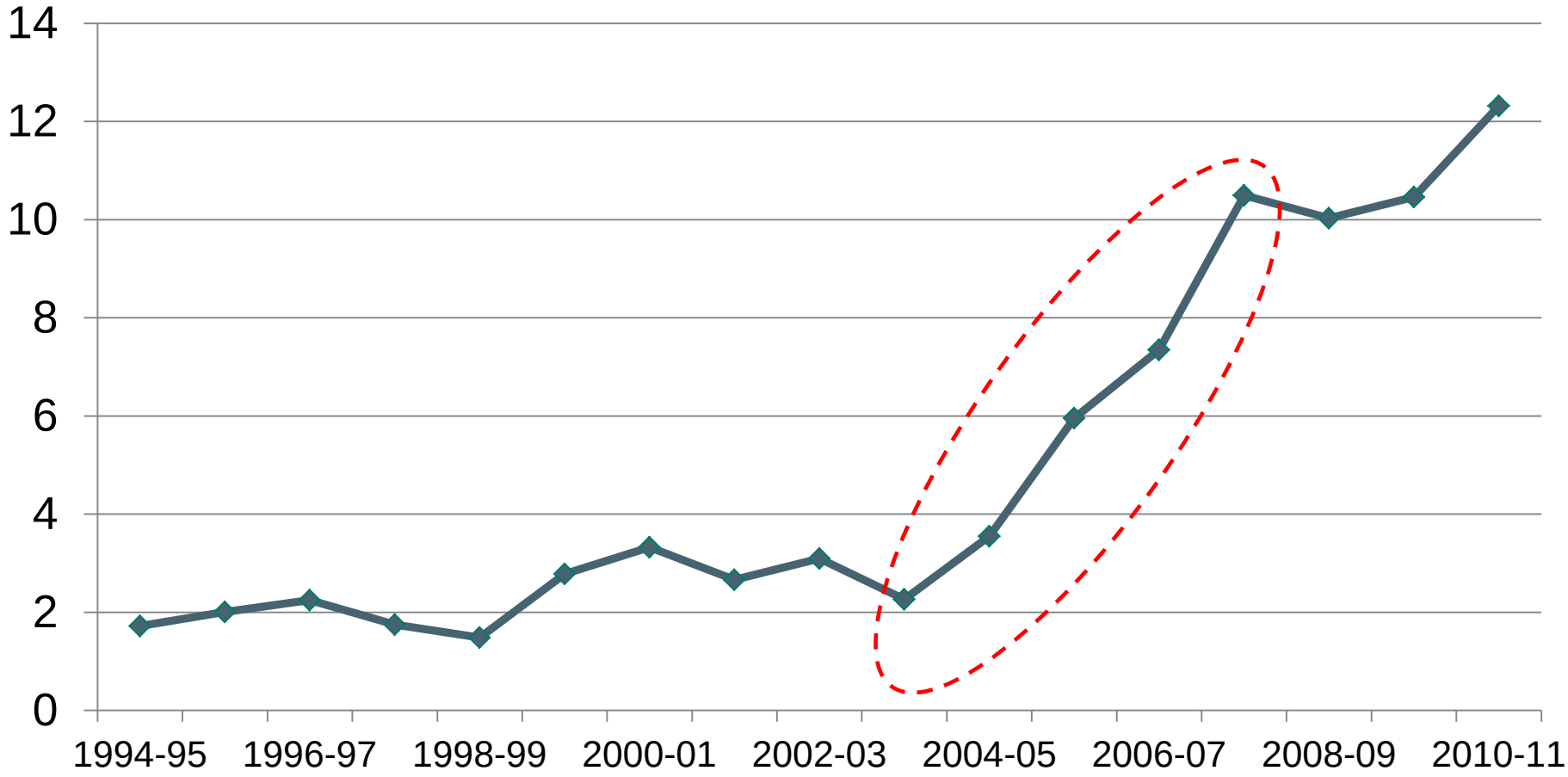
2. Ignored indigenous resources

- **Stalled oil and gas exploration** after major discoveries in Sindh in the 90s
  - Complacency and lack of focus on resolving Balochistan issue
  - Major international companies driven away by unattractive policy incentives (2001 Petroleum Policy)
- **Hydel largely ignored** after 1970s, sidetracked by politics
  - Only 6,600 MW of total 50,000 MW potential developed
- **Thar Coal still a pipedream**
  - No long-term Thar development plan
  - Ongoing projects held up by federal / provincial issues

3. Dependence on imported furnace oil

Value of Total Oil Imports (US$ BN)

Furnace oil about 60% of total



Source: State Bank of Pakistan

4. Lack of Political will to reform / deregulate

- Government does not have the political will to run the sector as a sustainable business:

Tariff = Generation Cost + Losses

  - Govt. should focus on lowering cost of generation and reducing losses for the benefit of consumers
  - Instead, the govt. keeps getting into circular debt trap by giving unsustainable subsidies

- Inefficient use of limited resources (e.g. gas) results in more cost to the economy
  - Gas must be allocated on the basis of efficiency and consumer interest and not on political whims

CRISIS TIME

Power Generation Crisis

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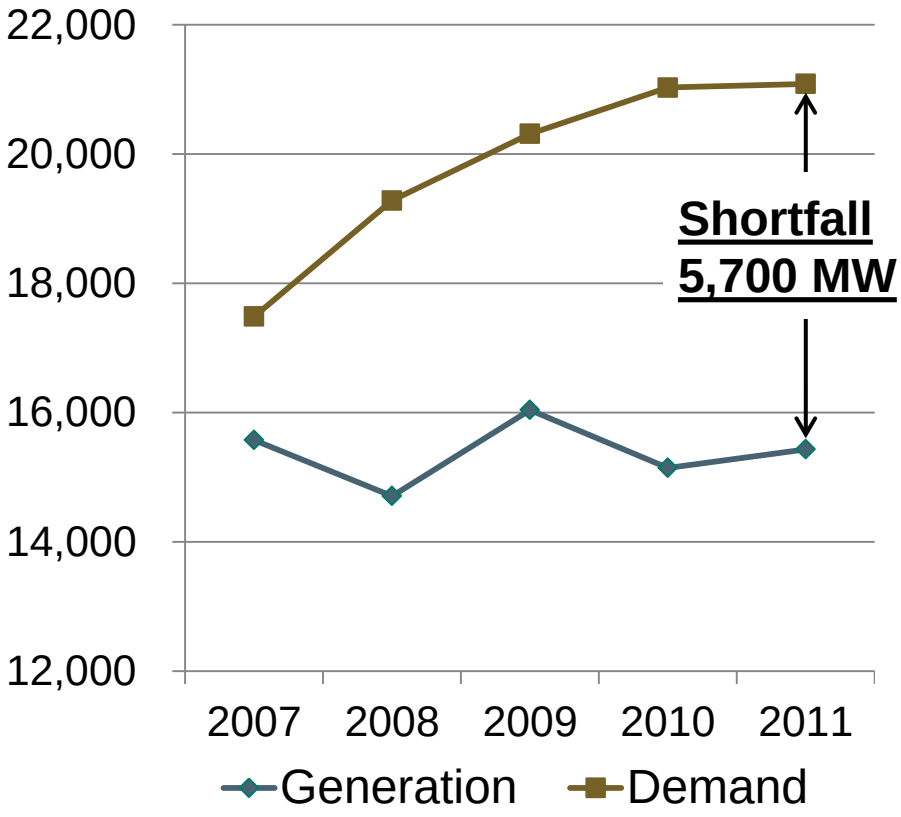
Demand / Generation in Peak Hours[1]

Figures in MW



Peak Demand Forecast by NTDC[2]

Current De-rated capacity	Scenario	Avg GDP Growth to 2025	Additional Demand by 2025
20,000 MW	Low growth	4.7%	40,000 MW
	Normal growth	6.0%	55,000 MW
	High growth	6.5%	65,000 MW

1. NEPRA State of Industry Report 2011 2. NTDC Electricity Demand Forecast published in February 2011

Power deficit may rise to over 11,000 MW in next five years with business as usual

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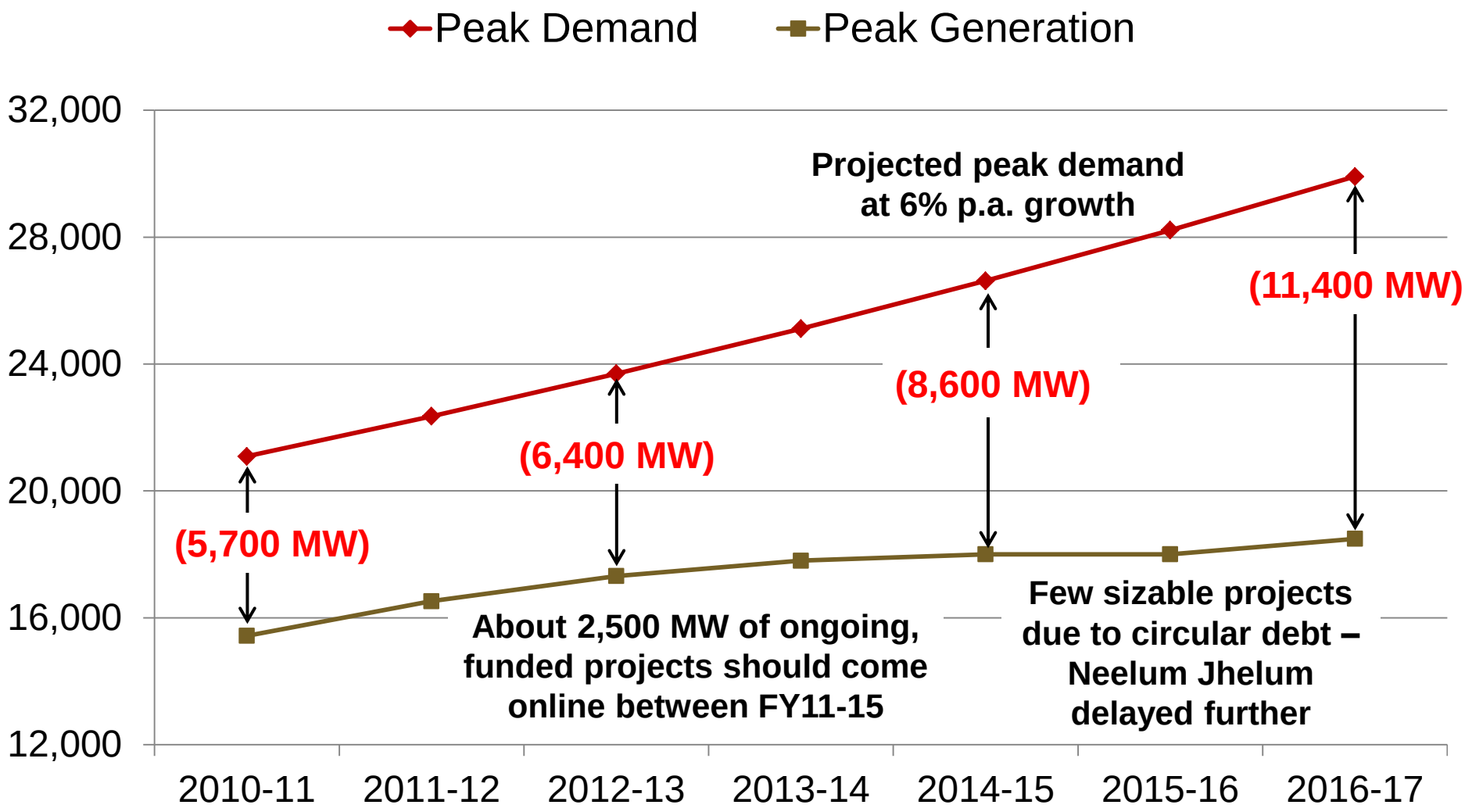

Source: NTDC National Power System Expansion Plan 2011, NEPRA State of Industry Report 2011, PPIB, WAPDA public documents

The Gas Crisis

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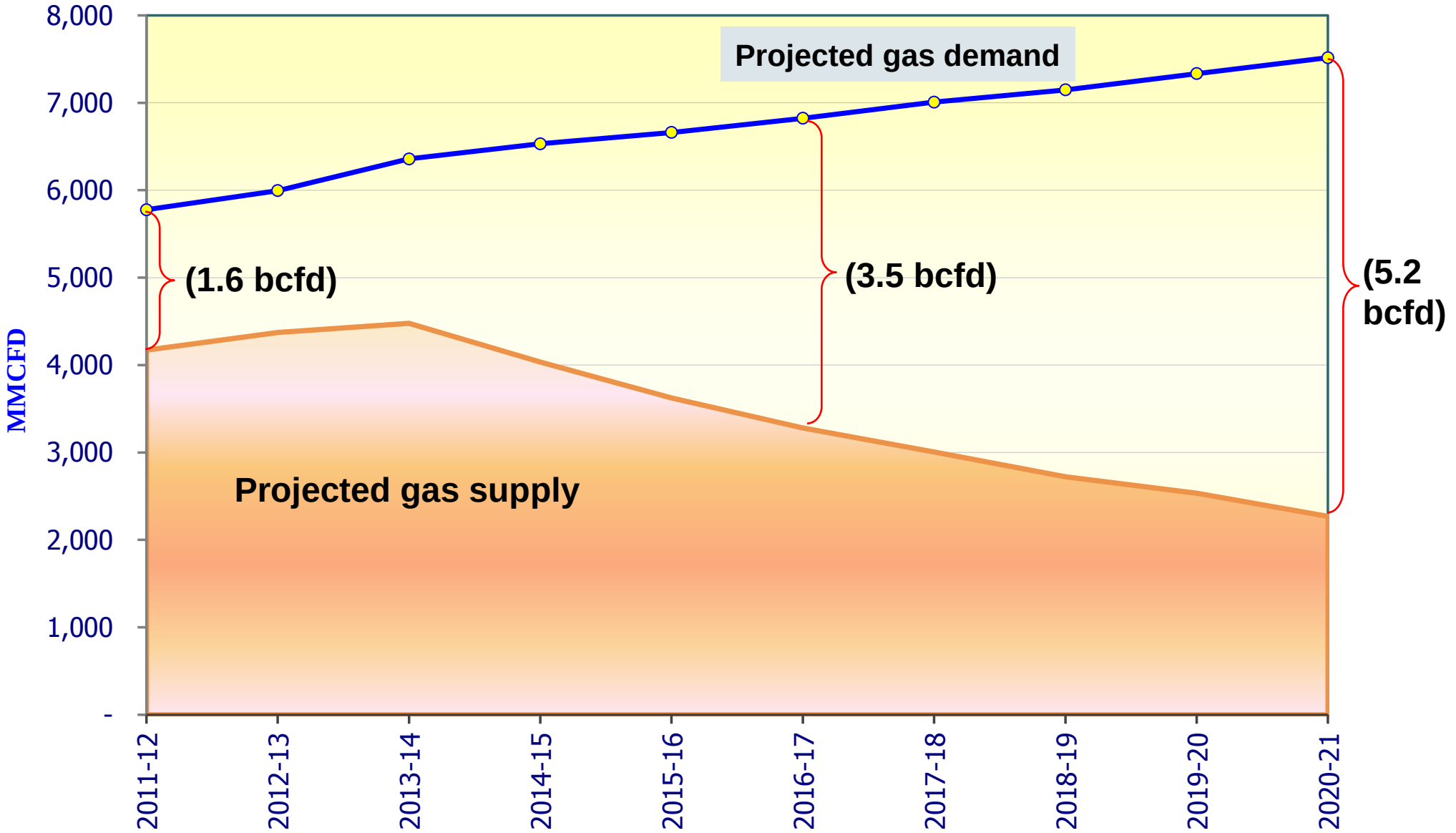
From **Crisis** to **Solutions**



Source: Petroleum Institute of Pakistan projections updated for actuals

Questions for Policy Makers

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- **Power Generation Crisis**
  - Based on NTDC's expansion plan, adding 40,000 MW by 2025 would require about $6 bn capital per year[1]
  - **Without making the sector financially viable, circular debt menace will not go away**
    - **Then where will the necessary capital come from?**
- **Gas Crisis**
  - **How will the gas shortfall be met?**
  - Iran Pakistan pipeline gas priced at $11-12 / MMBTU
  - LNG currently priced at $15-17 / MMBTU
  - But current indigenous gas purchased at $1.2-4.2 / MMBTU

1 Based on about $150 bn projected for adding 65,000 MW

CRISIS TIME

- We are standing at the edge of an **Energy Abyss** at a time when we are heavily indebted and fiscally stressed
  - Energy import bill will rise from $12 BN to $60-120 BN by 2025 depending on oil prices[1]
  - Gas imports will rise from 0% to 45% of energy mix[1]
- We will be unable to provide the energy required for Agriculture or Industry **except at an exorbitant cost**
  - This will **play havoc with inflation and economic growth**
- Poor and middle class households will be **unable to afford energy**

1 Pakistan Business Council

Main issues that need to be solved

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1. Mother of all issues…..lack of long term integrated planning due to poor governance

2. Circular debt / financial sustainability of sector

3. Replace wrong fuel mix with indigenous resources and cheaper imported fuels, while ensuring environmental sustainability

4. Resolve the gas crisis by increasing domestic supply and LNG / pipeline imports

5. Financing the massive future energy investment needs given acute fiscal crisis

1. 'Big Bang' Governance Reform

- Energy sector today like a **rudderless ship**
  - No strategic vision or planning
  - Lack of political ownership and capacity in ministries
  - More than 20 federal / provincial entities involved
- Create **single, professional Ministry of Energy**
  - Develop detailed, long term integrated energy plan based on PTI's vision presented today
  - Plan to be presented to parliament for consensus and approval

1. 'Big Bang' Governance Reform (cont'd)

- Merge OGRA and NEPRA into **single, efficient regulator**
  - Clearly define role and empower merged entity
  - Build capacity by inducting private sector professionals
- Liberate GENCOs, DISCOs, OGDC, etc. from govt. control
  - Appoint independent boards with real power
  - **CEO to be selected by board, not government**
  - Transition to a sustainable, efficient model of management
- Agree **time bound targets** with the boards
  - Hold boards accountable for performance
  - Progress on losses / collections to be publicly available

1. 'Big Bang' Governance Reform (cont'd)

- **Empower new professional management** to achieve immediate impact
  - Zero govt. interference in field postings
  - Provide **legislative force** for recovery of undisputed dues
- For example:
  - Automatic disconnection after 30 days of non-payment
  - Reconnection only on new terms (e.g. reconnection charge, prepaid meters)
  - Automatic adjustment of undisputed govt. dept dues at source

1. 'Big Bang' Governance Reform (cont'd) – Liberate small scale generation

- **Open the field to small and medium investors**
  - Announce attractive upfront tariffs for small projects with standard 5-10 year contracts
    - Municipal waste, agriculture biomass, domestic coal, etc…
  - Anyone to able to sell any amount of power at these tariffs
  - DISCOs obligated to take power as long as rate is below marginal cost of the system
- **Rethink rural electrification** with renewable, off-grid solutions
  - Micro Hydel (e.g. Gilgit Baltistan, Chitral, etc.)
  - Biomass gasification (e.g. Husk Power Systems in India)
  - Solar (e.g. Grameen Shakti in Bangladesh), etc.

1. 'Big Bang' Governance Reform (cont'd) – Declare Emergency on Energy Conservation

- **Huge savings potential** equivalent to 50% reduction in oil imports[1]
- Energy conservation based on **incentives not just decree**
- Energy audits of industry with incentives to reward efficiencies
- Green standards for appliances – inefficient ones phased out
- Innovative measures to support smart household choices
  - Conical baffles in existing gas geysers
  - Replacement of gas geysers with solar water heaters
  - Community level biogas systems
  - Energy efficient tubewells…etc, etc

1 Integrated Energy Sector Recovery Report & Plan by Friends of Democratic Pakistan

2. Circular Debt Crisis

- Two issues: accumulated stock and flow
- History of accumulated stock
  - 2009: Rs. 300 bn TFCs issued at KIBOR + 2.5%
  - 2012: Rs. 151 bn TFCs issued at KIBOR + 1.0% with 20% rate for late payment
  - Balance: Rs. 244 bn
- Issuing TFCs without stopping flow **pointless** and simply **mortgaging future generations**
- Flow is recurring difference between cost and recovery
  - Reportedly Rs. 1 bn per day being added to stock

2. Illustrating Circular Debt Flow (PEPCO)

Units to be Generated in 2011-12	
93 bn kWh	Avg NTDC Cost: Rs 8.93 / kWh

↓

Units to be Sold in 2011-12	
75 bn kWh (19.5% losses)	Losses of Rs. 162 bn

↓

Units Recovered	
66 bn kWh (88% collection)	Losses of Rs. 84 bn

↓

Additional Leakages
Interest on late payment/disallowances etc.: Rs. 53 bn

Expected Annual Loss (Conservative): Rs. 300 billion

2. Circular Debt Flow – The Options

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- **Business as Usual**
  - Increase tariff by Rs. 3.1 / kWh to cover inefficiencies / losses
  - …Or build up more circular debt and cripple the power sector
- PTI's approach (**actually** decrease losses and reduce costs)
  - Decrease losses to 10% and increase collection to 95% to **save Rs. 125 bn** per annum
  - Convert 4,500 MW of furnace oil plants to imported coal to save **Rs. 350 bn** per annum

2. Solving Circular Debt
Losses and collections – current situation

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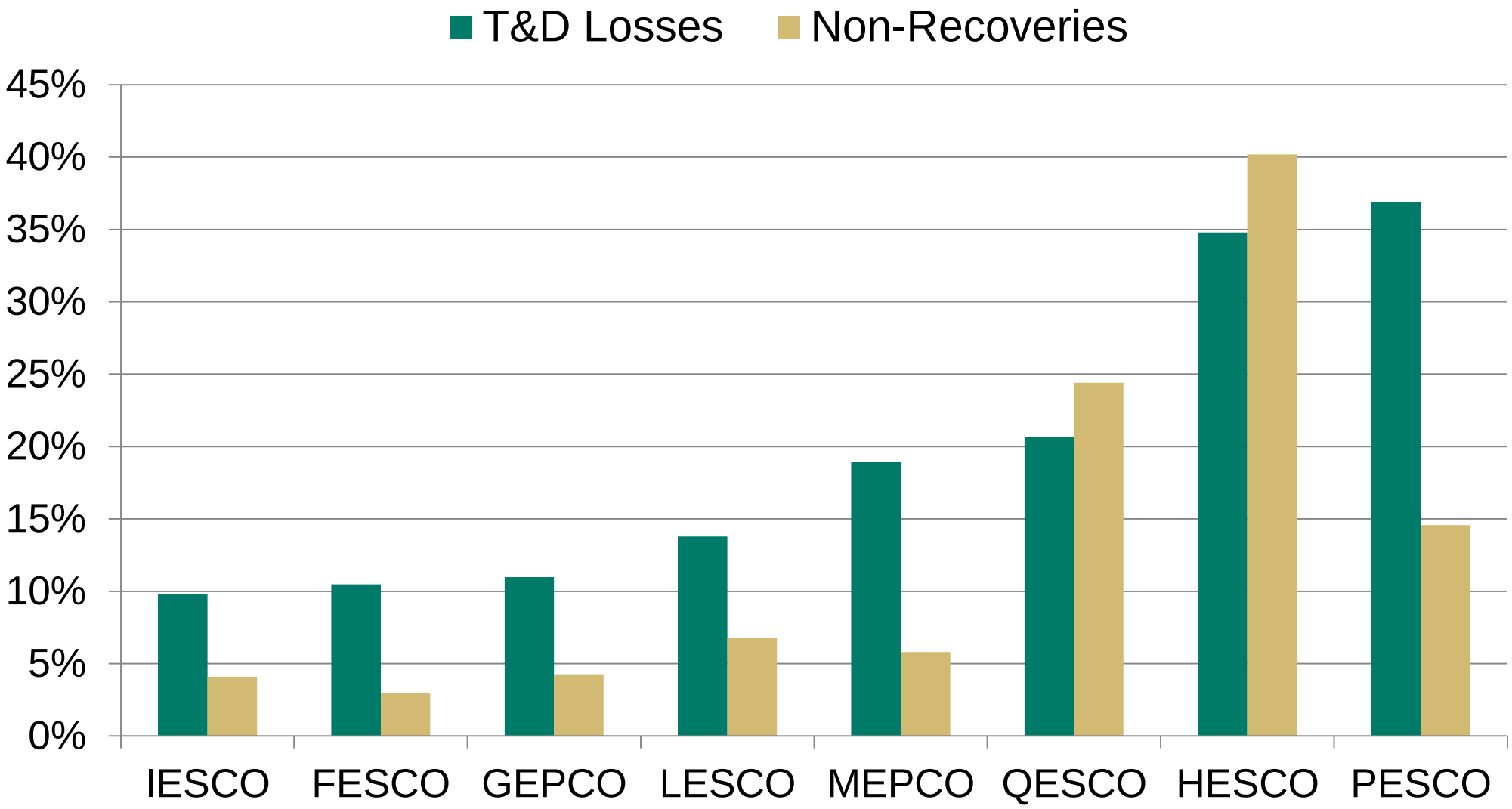

Source: NEPRA State of Industry Report 2011

2. Solving Circular Debt
Converting furnace oil plants to imported coal

		IPP	GENCOs	Total
Capacity to Convert	(MW)	2,022	2,605	4,627
Capital Cost	($ MM)	1,011	1,303	2,314
Savings				
Fuel Savings	($MM)	1,630	2,714	4,344
Additional capacity payment	($ MM)	(208)	(268)	(475)
Net Annual Savings	**($ MM)**	**1,422**	**2,446**	**3,868**

Estimated annual savings of $3.9 BN / Rs. 350 bn

Source: Calculations based on NEPRA, PPIB figures

2. Solving Circular Debt – PTI's Plan

	Current	Year 1	Year 2	Year 3	Year 4
Reducing losses					
T&D losses	19.5%	17%	14.5%	12%	10%
Annual Savings (Rs. bn)	-	20	40	60	75
Improving collections					
Recovery rate	88%	89.8%	91.5%	93.3%	95%
Annual Savings (Rs. bn)	-	12	25	37	50
Coal conversion					
MW converted	-	-	-	1,500	4,500
Annual Savings (Rs. bn)	-	-	-	120	350
Total Annual Savings (Rs. Bn)	-	**32**	**65**	**217**	**475**

3. Wrong Fuel Mix – Two thirds of electricity from oil and gas

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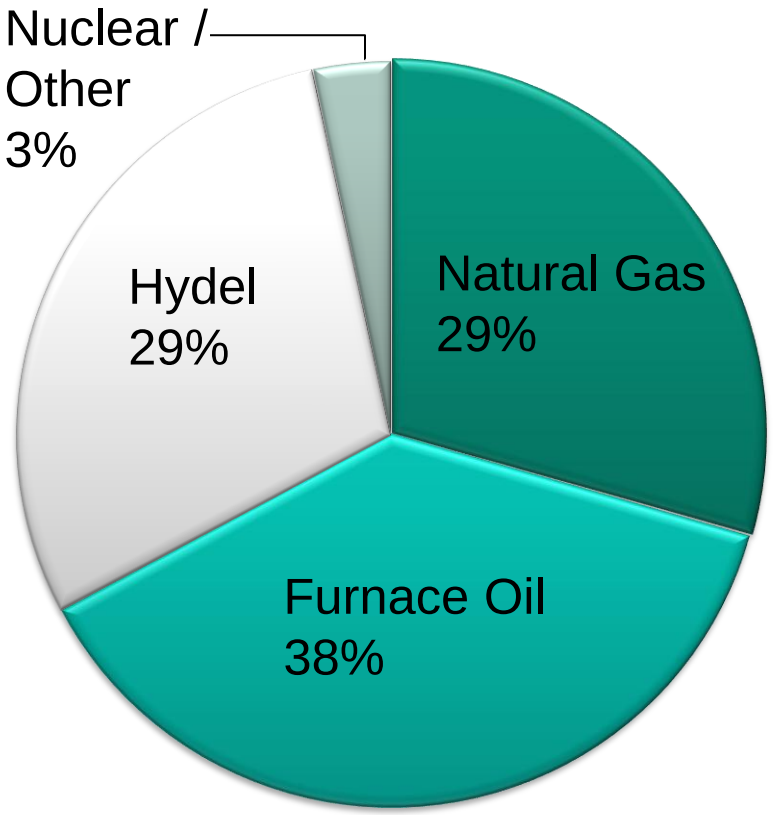
Electricity Generation by Source
2009-10 Total: 95,608 GWh



Electricity generation by coal
Global comparisons to Pakistan

Country	Power Generated from Coal (%)
Australia	80
China	78
India	53
USA	50
Germany	47
UK	30
World Average	**42**
Pakistan	**0.1**

Source: Pakistan Energy Year Book 2010, Sindh Engro Coal Mining Company presentation

3. Wrong Fuel Mix – The Options

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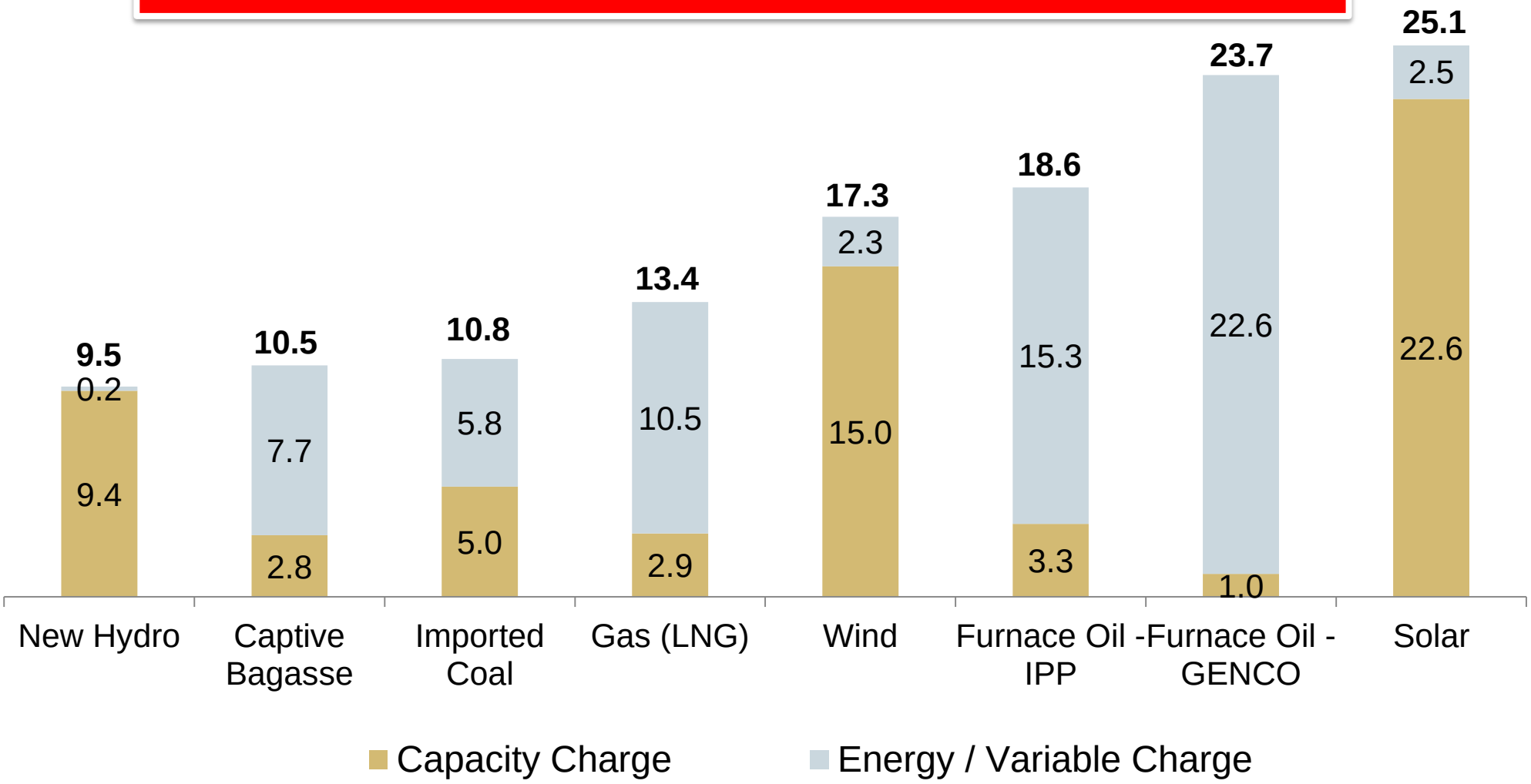
Comparative tariffs by type of fuel (in Rs. per kWh)

All tariffs levelized for new plants except for GENCO which is current



Source: Crosby Capital

Note: Calculations assume funding in local debt. GENCO fully depreciated plant.

پاکستان تحریک انصاف

3. Correcting Wrong Fuel Mix – Thar Coal

- Thar Coal will be prioritized as a **game changer**:
  - More energy than Saudi Arabia & Iranian oil reserves
  - Will bring prosperity and development to rural Sindh
  - Provide Pakistan a long-term source of energy security
- Block I, II, VI & VIII extensively investigated
  - Credible local and international developers
  - Total reserves of 10.2 billion tons just in these blocks
  - 4,200 MW can be developed in each block

3. Correcting Wrong Fuel Mix – PTI's Thar Coal Vision

- **Master mining plan** essential to realize potential
  - 80% of the challenge is mining **not** power generation
  - Explore all options for optimal development of Thar
- Mining plan to be supported by **test / development mine**
  - Will provide actual data on mining challenges, hydrology, design and costs
- **All out support** to existing viable projects
  - Delayed infrastructure projects to be cleared and built asap
  - 6.5 million t/a mine and 1,200 MW **must come online** by 2017
  - To be scaled up to 90 million t/a mining and 16,800 MW by 2025

3. Correcting Wrong Fuel Mix – Hydel

- 50,000 MW potential…..only 6,600 MW exploited
- Vast untapped **Cascading** potential
  - **14,500 MW** utilizing the same water from Basha, to Dasu, to Patan, to Thakot before reaching Tarbela
  - Similar cascades on Kunhar and Swat rivers
- Issues with hydel
  - Benefit sharing between local area, affectees and govt. tiers
  - Long gestation periods and highly capital intensive
  - Risk of unforseen technical issues
  - Issues of land acquisition, particularly for private sector

3. Correcting Wrong Fuel Mix
PTI's Vision…..Hydel on War Footing

- Development of hydel will take **decades** with business as usual
  - Neelum Jhelum cost has risen from Rs. 85 BN to Rs. 350 BN
  - Completion date extended from Oct. 2015 to end 2018
    - Original PC-I approved in 1988 for Rs. 15 BN

- PTI govt. will add **4,000 MW within five years** by providing institutional support and decisive decision-making
  - 2,500 MW public (Neelum Jhelum + Tarbela extension)
  - 1,000 MW CASA import
  - 500 MW IPPs

4. Resolving the Gas Crisis – Unrealized Potential

- Current gas reserves of 29 TCF (will last about 16 years)
- 60% of the exploration acreage is held by public sector companies who have not delivered
- E&P declining due to wrong pricing and security issues
  - 2009-10: 100 wells planned and only 30 drilled
  - 2010-11: 80 wells planned and only 50 drilled
  - 2011-12: 76 planned and only 27 drilled till January
- Pakistan has **huge potential (100 TCF+) of tight / shale gas**
- But very basic data, information and expertise about unconventional gas resources

4. Resolving the Gas Crisis – The Solution

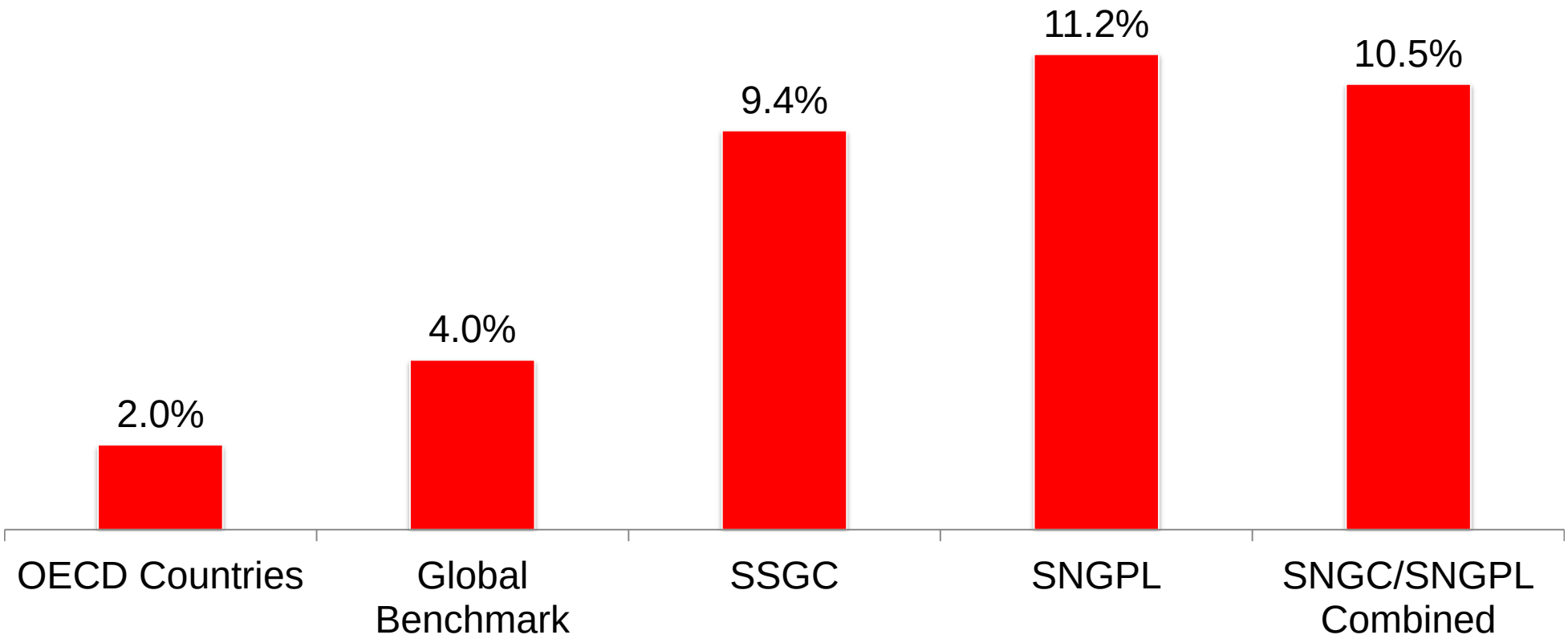
- Domestic wellhead gas is seriously mispriced

Domestic Price	Pipeline import	LNG Import	Crude Oil
$1.2-4.2	$11-12	$15-17	$17-18

- Add 2,000 mmcfd of domestic gas within 5 years by facilitating and incentivizing existing and new investors:
  - Premium for additional (in-fill) gas from depleting fields
  - Increased wellhead price for new conventional gas discoveries
  - Premium above wellhead price for tight / shale gas discoveries
- Target inreased exploration – 100 new wells to be drilled per year
- Specific share of gas levy to flow directly to local Tehsil / District
- Fast-track 1,500 mmcfd of gas imports as interim measure

4. Resolving the Gas Crisis - Reducing Losses

UFG as % of total production in 2010-11



Source: SSGC, SNGPL annual reports

5. Financing future energy investments

- **Massive investment** required (estimates in the range of 3% of GDP)
- Governance reform, decisive leadership, macroeconomic stability and sanctity of contracts required to unlock capital flows
- Fresh lending largely dependent on foreign sources
  - Local banks' exposure to power sector already at 30%
- Raising the required level of capital is a Herculean task…but the **challenge is surmountable** with all-out effort
  - Pakistan attracted 3.2% p.a. of GDP (mainly offshore) into the Power sector in 1994-97
  - In last 5 years, India has attracted $30 bn p.a.

5. Financing future energy investments – contd.

- Urgently address key issues holding back local flows
  - Resolve circular debt and deepen banking market
  - Develop long term bond market including Sukuk/Islamic bonds
  - Charge losses/subsidies to budget instead of issuing TFCs
- Catalyze energy investments by setting up Infrastructure Development and Finance Institution ("IDFI")
  - India has three IDFIs, China has world's largest ($700 bn)
  - Subscribers would include Overseas Pakistanis, domestic and international investors, sovereign funds, etc.

PTI's vision

By tackling the five key issues, i.e.

1. **Poor governance**
2. **Circular debt**
3. **Wrong fuel mix**
4. **Gas crisis**
5. **Financing**

Resolution of the energy crisis becomes possible in the following manner and timeframe…..

PTI's Energy Sector Vision
Closing the Gas Deficit

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	Baseline	Short Term			Mid Term	
MM cfd	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**
Demand	5,777	5,995	6,358	6,531	6,661	6,823
Supply	4,172	4,372	4,479	4,035	3,623	3,282
Gap with Business as Usual	**(1,605)**	**(1,623)**	**(1,879)**	**(2,496)**	**(3,038)**	**(3,541)**
Pipeline / LNG imports	-	-	500	500	1,000	1,500
Additional domestic gas from existing fields		100	200	500	500	1,000
Domestic tight gas	-	-	-	500	500	1,000
Reduction in unaccounted for gas	-	50	100	150	200	200
Additional Gas (cumulative)	**-**	**150**	**800**	**1,650**	**2,200**	**3,700**
Gap with PTI's actions	**(1,605)**	**(1,473)**	**(1,079)**	**(846)**	**(838)**	**159**

PTI's Energy Sector Vision
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	Baseline	Short Term			Mid Term	
MW	**2011-12**	**2012-13**	**2013-14**	**2014-15**	**2015-16**	**2016-17**
Demand (6% increase pa)	22,351	23,692	25,114	26,621	28,218	29,911
Supply	16,523	17,313	17,801	18,001	18,001	18,488
Business as Usual Gap	**(5,828)**	**(6,379)**	**(7,312)**	**(8,619)**	**(10,216)**	**(11,422)**
Existing offline capacity brought back online	-	1,000	2,000	2,500	2,500	2,500
Energy efficiency / small scale generation	-	100	500	1,000	1,000	1,500
Gas IPPs (on LNG)	-	-	-	500	1,000	2,000
Imported / Thar Coal IPPs	-	-	-	-	500	1,700
Hydel Public Sector	-	-	-	-	1,075	2,485
Hydel IPPs / CASA import	-	-	-	-	500	1,500
Additional MW (cumulative)	**-**	**1,100**	**2,500**	**4,000**	**6,575**	**11,685**
Gap with PTI's actions	**(5,828)**	**(5,279)**	**(4,812)**	**(4,619)**	**(3,641)**	**263**

How PTI will ensure implementation when others have not…

- Transfer power from ourselves to professionals in the energy sector
- Create an enabling environment to attract the 'best of the best' human resources from Pakistan and all over the world
- Create a transparent, consistent and innovative policy environment backed by **decisive leadership** in order to attract the required level of capital flows
- Empower and incentivize the public sector to ensure timely, rigorous implementation of the PTI energy vision
- Instill a culture of monitoring and accountability throughout the sector

PTI's 100 Day Transformative Actions

- Launch 'Big Bang' governance reform
  - Create Ministry of Energy
  - Liberate energy sector state enterprises from govt. control
- Finalize framework for long-term integrated plan
- Launch conversion process from furnace oil to coal
- Finalize Thar coal plan between federal / provincial govt.
- Launch new policy framework for gas (domestic, import, losses)
- Launch action plan to accelerate hydel development

What PTI's action plan will achieve…

- **Short term (0-2 years)**
  - Turn around state of near collapse
  - Minimize impact of power/gas shortages on the economy
  - Reduce burden of ever-increasing tariffs on the poor
- **Medium term (within 5 years)**
  - Resolve circular debt crisis and unlock capital flows
  - Plug gas deficit by increasing domestic and imported supply
  - Eliminate load shedding through bringing existing offline capacity online, increased efficiency and adding new capacity
  - **Fundamentally transform energy mix and begin Pakistan's transition to an energy secure state**

Annex

Power Crisis – Coal Conversion Logistics

- Coal conversion golden opportunity to **revitalize railways**
- Create a Logistics Holding Company
  - **Public Private Partnership** - owned by private sector (e.g., IPPs, transporters) and railways
  - Will **pay lease** for access to railway track
  - Will **rehabilitate old engines / rolling stock** or procure new ones as required
- New Coal/Clinker Terminal to be fast tracked
  - Current port capacity: 4 million tonnes
  - Can go up to 6 million before further investment

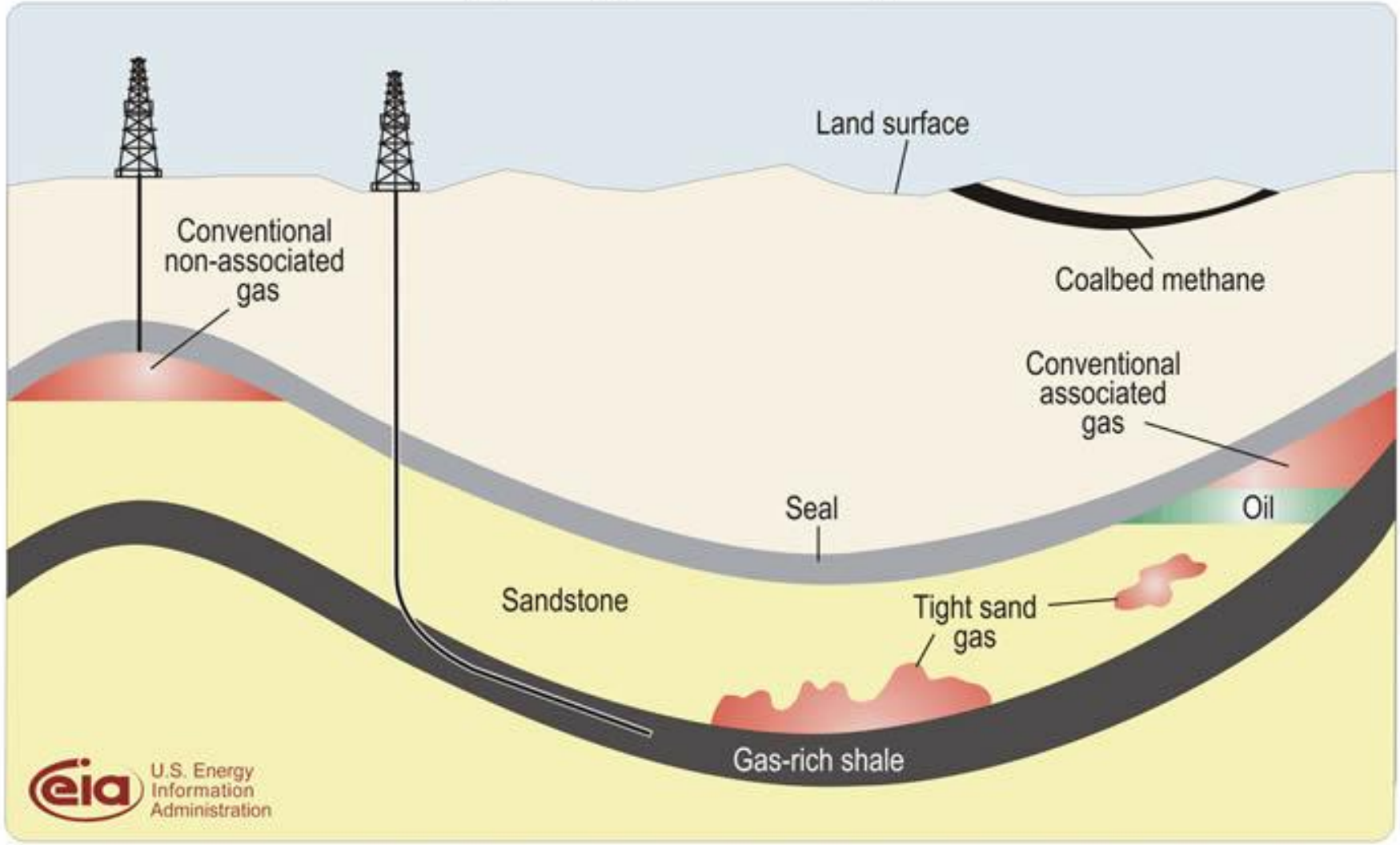
Comparing Pakistan's wind tariff to India

State	Installed wind capacity (MW)	Mean wind speed at 50 m (m/s)	Tariff rate (PKR / kWh)
Andhra Pradesh	177	4.9-6.6	7.0
Gujarat	2,005	4.3-7.0	7.1
Karnataka	1,576	5.2-8.4	7.4
Kerala	28	4.4-8.1	7.3
Madhya Pradesh	231	5.0-6.3	8.7
Maharashtra	2,202	4.3-6.6	6.8-10.1
Rajasthan	1,353	4.0-5.7	7.7-8.2
Tamil Nadu	5,503	4.5-7.4	6.8
Pakistan	6	4.0-10.9	17.3

Indian states generally also do not provide any tariff escalation

Source: Indian Wind Energy Outlook 2011 – Global Wind Energy Council

Schematic geology of natural gas resources

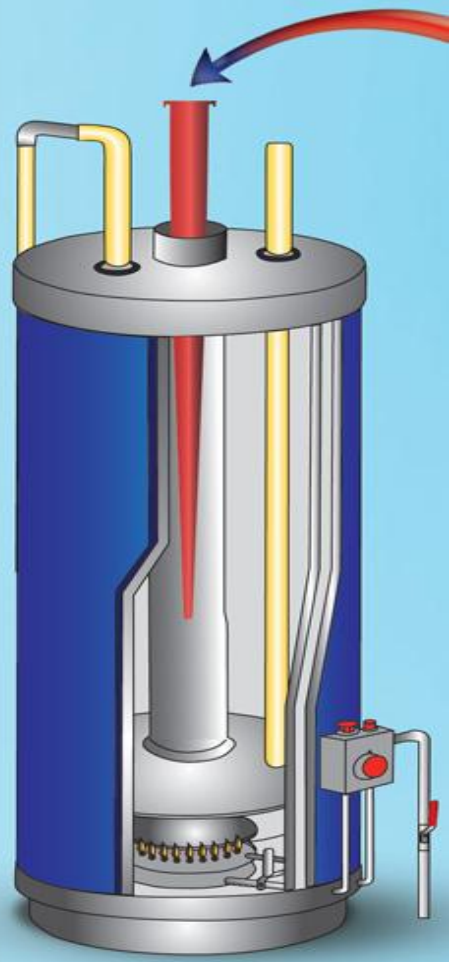


Prepare for the Winter!
Use Conical Baffle in geyser to save

- ✓ UPTO 25% GAS
- ✓ UPTO 45% CASH

- Geysers without Conical Baffles consume more gas & increase gas bills.
- SNGPL recommends manufacturers and consumers to **install** Conical Baffles in their geysers and save on gas bills.

Conical Baffles may be purchased from SNGPL's Regional Offices. These are also available in the market with geyser manufacturers/sellers.



SUI NORTHERN GAS PIPELINES LIMITED

www.sngpl.com.pk

In case of gas leakage anywhere, report immediately on our **Helpline: 1199**

Existing power tariff structure

Category	Notified tariff (Rs. / kWh)	% of Total Consumption	% of Total Subsidy
Residential (1-50 kW)	1.87	3.43	8.58%
Residential (1-100 kW)	4.54	8.97	16.33%
Residential (101-300 kW)	6.86	22.03	27.32%
Residential (301-700 kW)	10.65	6.25	1.83%
Residential (Above 700 kW)	13.29	3.59	-
Commercial	6.50-13.00	7.18	5.80%
Industrial	6.50-12.25	26.2	12.30%
Agriculture	4.55-10.11	15.48	18.20%
Bulk	6.25-11.31	3.32	2.20%
Other		0.03	3.90%
Total		**96.48%**	**96.45%**

Source: ECC Summary

Gas Tariffs

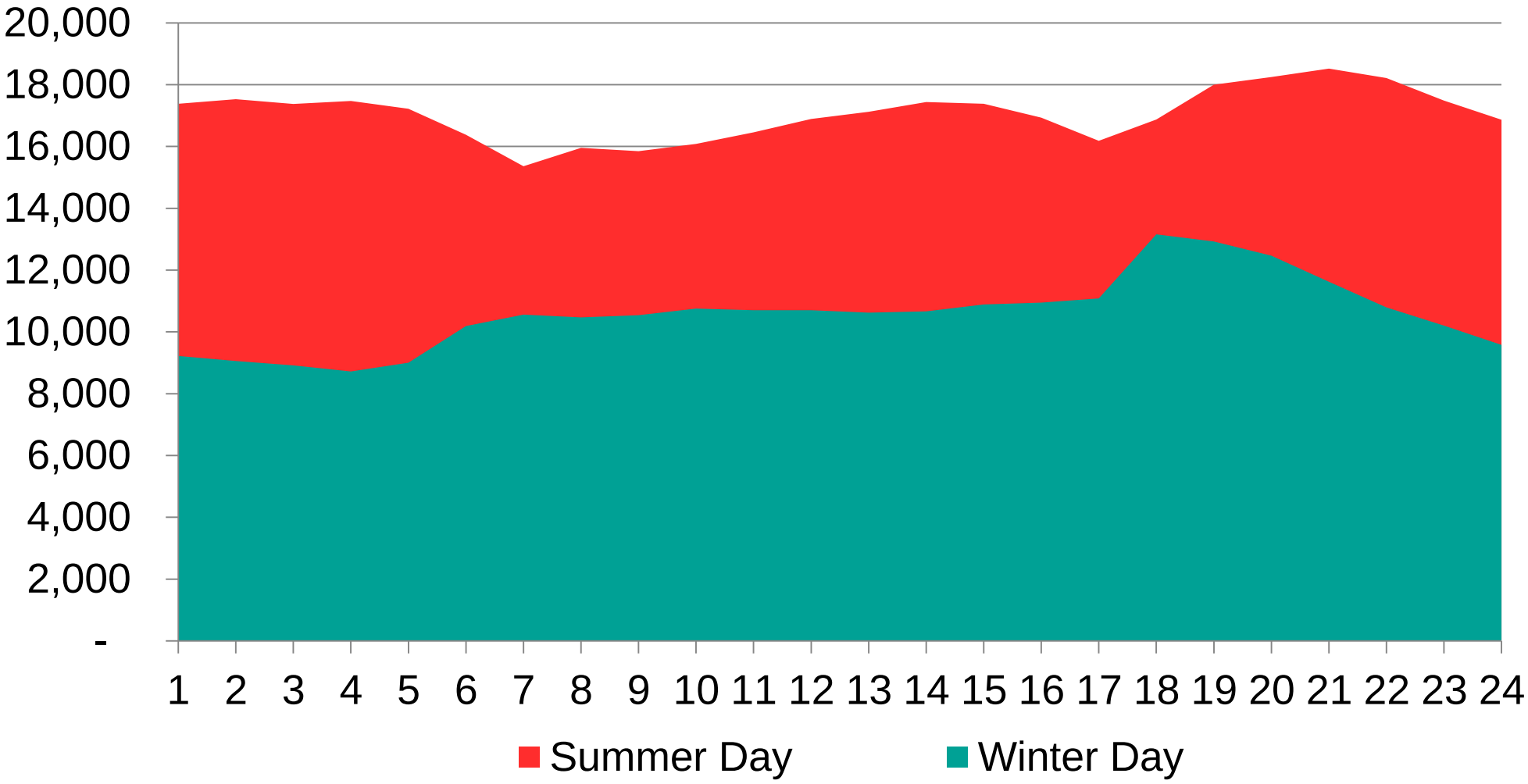
- Religious / Educational / Health / Govt. /Army offices: Rs 123 – Rs 496 (depending on use)
- Residential: Rs 123 – Rs 1302 (depending on use)
- Commercial: Rs 600 (flat rate)
- Industrial: Rs 495 (flat rate)
- CNG: Rs 652 (flat rate)
- Cement: Rs 694 (flat rate)
- Fertilizer: Rs 61-116 (for feedstock)
- Fertilizer: Rs 495 (for power generation)
- GENCOs: Rs 481 (flat rate)
- IPPs: Rs 438 (flat rate)

Source: OGRA price notification Dec 30, 2011

Affording higher wellhead gas prices

- Average purchase price of SNGPL / SSGC is $3.3 / MMBTU
- Due to unaccounted for gas (UFG), this price becomes $3.85
- If 1,000 mmcfd is purchased at $6 / MMBTU, avg. purchase price of SNGPL / SSGC will go to $3.6 / MMBTU
- If UFG is cut from 11% to 5%, no sales price increase will be required
- Premium for tight / shale gas can be supported by reorganizing gas tariff structure
- These alternatives are much cheaper than gas imports

Peak Demand Pattern (MW)

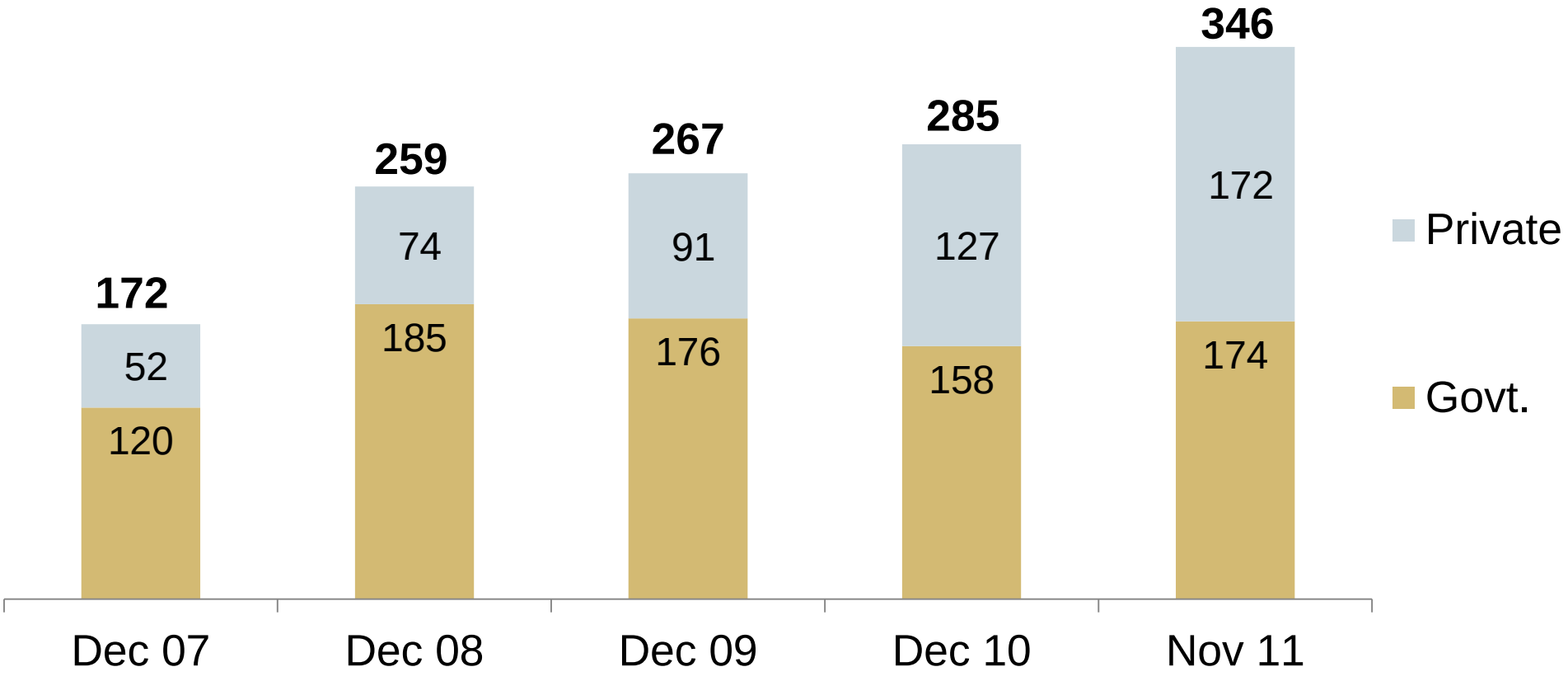


Difference of 5,000 MW between summer and winter

Source: NEPRA State of Industry Report 2011

PEPCO receivables

Receivables of PEPCO: Year-Wise Comparison (Rs. BN)



Circular debt increasing at the rate of Rs. 1 billion / day

Source: PEPCO