

PROMOTING SUSTAINABLE DEVELOPMENT
THROUGH
ENERGY AND EMISSION EFFICIENCY

A WHITE PAPER
FOR
POSSIBLE GOVERNMENT POLICY INITIATIVES

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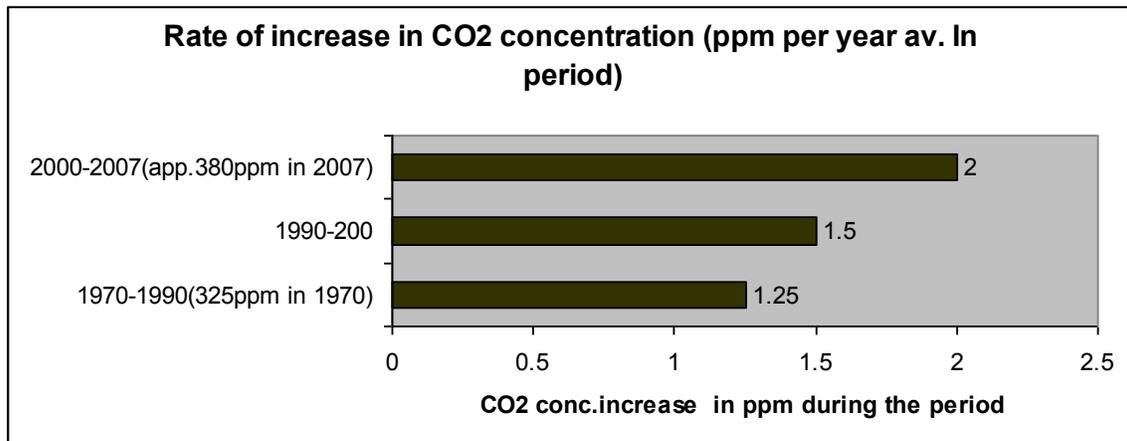
October,2012

EXECUTIVE SUMMARY

We have prepared this white paper outlining the need for sustainable development, role of energy and emission efficiency in promoting sustainable development, review of existing policies and Laws in this regard and suggesting additional measures required by way of Government policy initiatives and Laws which can help in achieving a robust ‘Sustainable Development’ based growth model. We have done the analysis for India and the state of Gujarat since it is considered as one of the most developed state.

‘Sustainable Development’ is the key principle in deciding long term strategies of all the major businesses and Governments in the emerging competitive global market place.

Fourth assessment report published by IPCC in 2007, has brought out the disturbing trend of rapid rate of increase in global CO₂ concentration in last decade and thereby limited time period available for global community to act to keep it at manageable level.

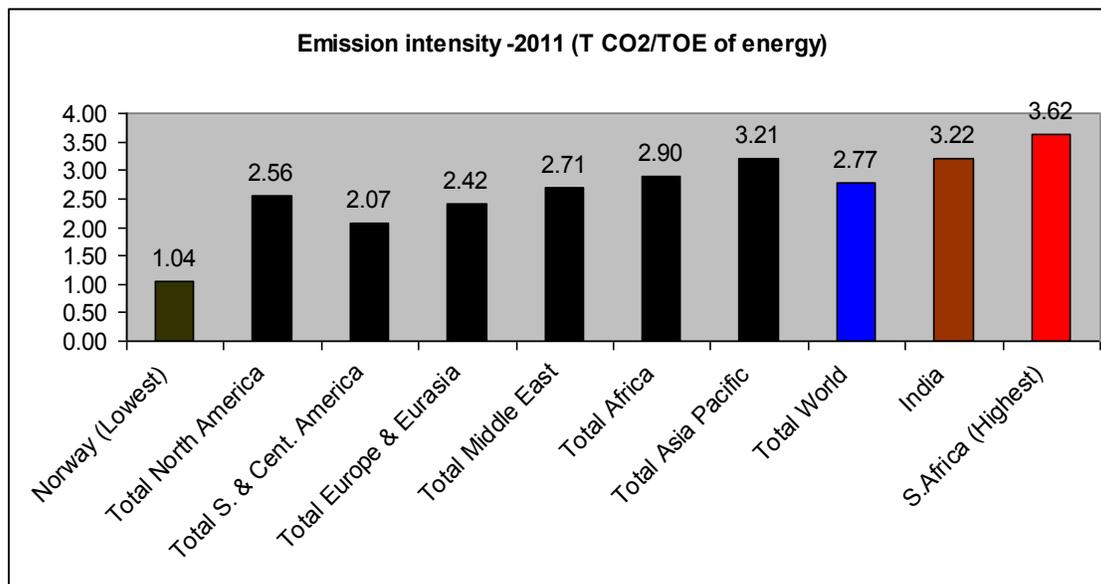


However, international negotiations in the period from 2008 till now have not resulted into an agreed target for reduction of emissions for each country and has given rise to serious doubts about the sanctity of Kyoto Protocol. Only broad agreements in the form of working towards limiting the global temperature rise to less than 2 *C (with corresponding CO₂ concentration level not exceeding 450ppm level) have been reached at recent international meets of political leaders at highest level.

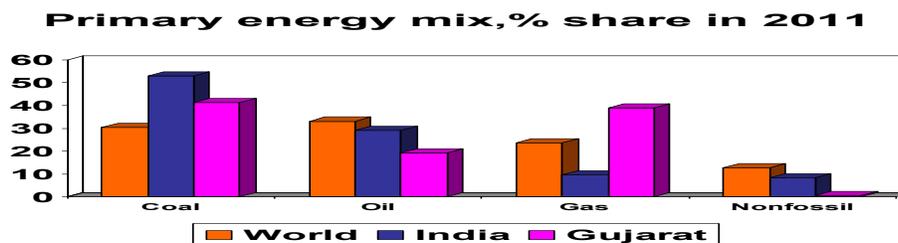
The Hon'ble Prime Minister of India, during such international meet in 2010, made a voluntary commitment to reduce emission intensity of India's GDP by 25% by the year 2020.

Thus, India has to strategise its economic growth path in a manner which is consistent with this commitment made to international community.

Use of fossil fuels results in emission of CO₂ and the amount of CO₂ emitted per unit of energy consumed depends on the energy-mix i.e. relative quantities of three major fossil fuels viz. coal, oil and gas. Thus, every economy emits different amounts of CO₂ per unit of energy consumed. This is clearly depicted in following figure:



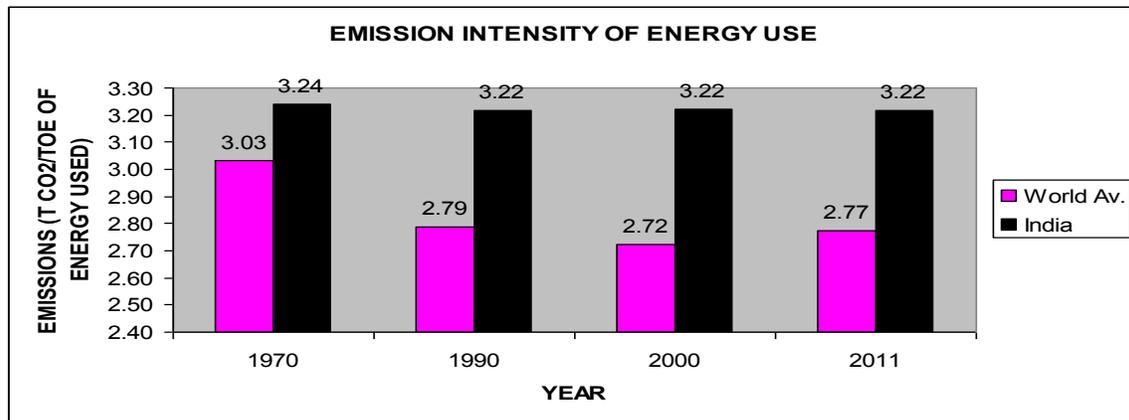
The world average energy mix has been showing a slow but steady trend towards use of fossil fuels with lesser emissions (eg. Increased use of natural gas in energy mix).



Another significant trend observed in Indian economic growth is rapid decrease in share of noncommercial energy (like cowdung, firewood etc.) in overall energy demand. The share of noncommercial energy has come down from 63.5% to 23.6% in about five decades (as per Planning Commission report).

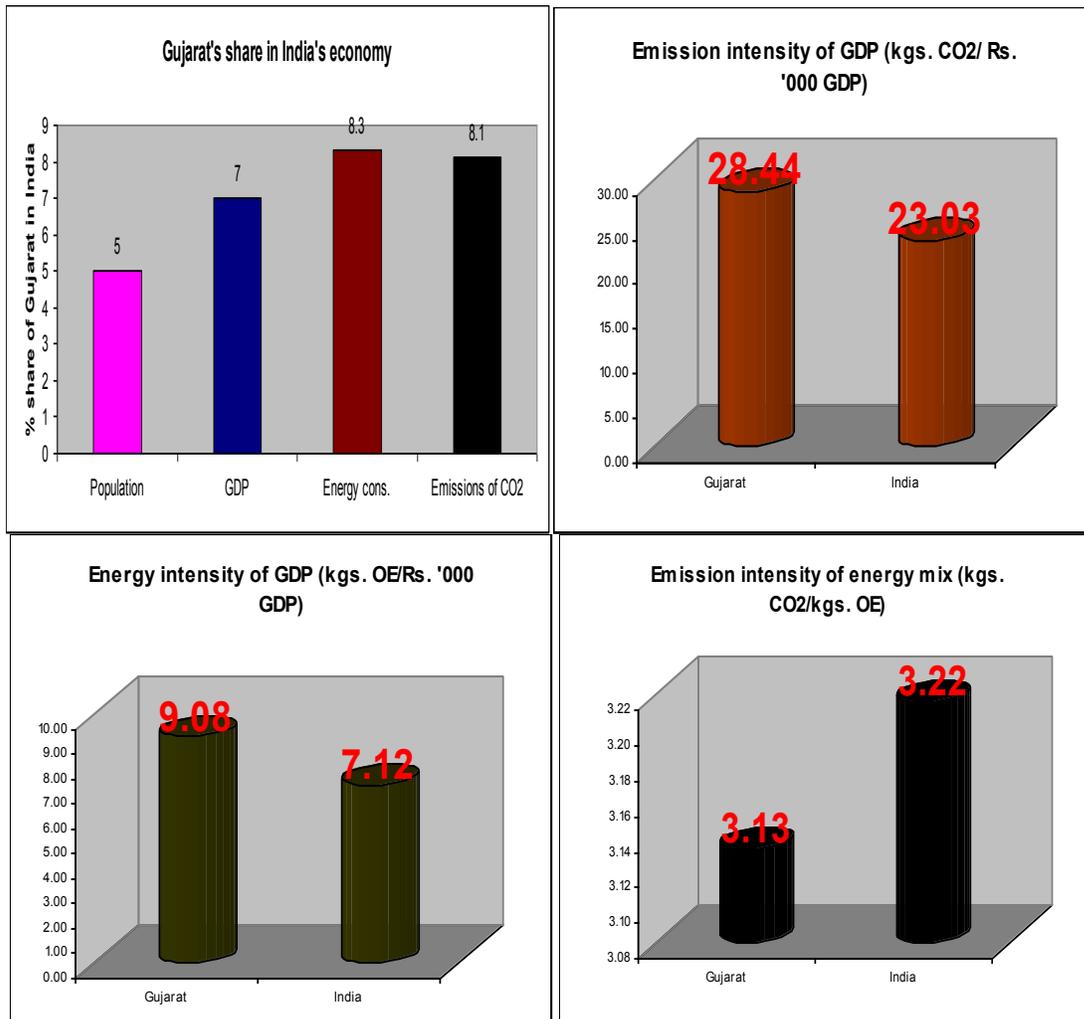
Thus, energy and emission intensity of commercial energy usage in GDP growth will impact growth path.

One of the indicators of the trend in emissions with respect to growth in energy consumption is the emission intensity of energy use in economy. The trend observed is depicted in following figure:



As can be seen from the above figure, India's emission intensity of energy use is much higher than world average and unlike world trend it has not shown decreasing trend. **This is a major factor which will have to be addressed for ensuring reduction in emission intensity of India's GDP.**

In summary, if we were to present the energy and emission intensity of India and Gujarat, it can be as per following figures:



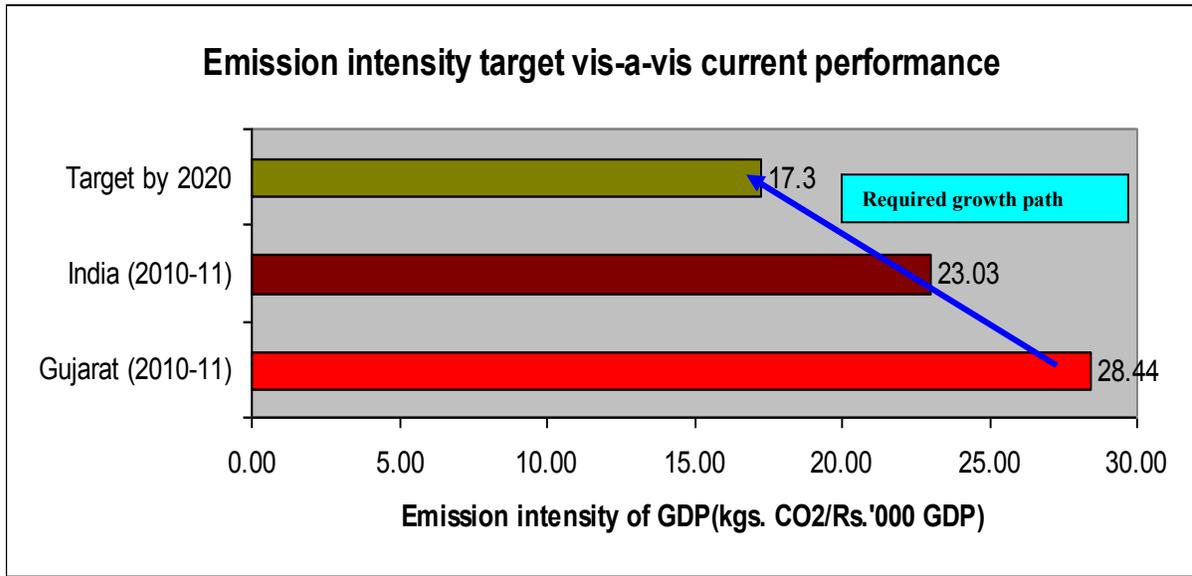
Gujarat economy has higher energy intensity than India's economy due to very high share of Industry in Gujarat's GDP.

Gujarat emission intensity is high, despite high share of cleaner energy like gas, due to higher energy intensity of economy in Gujarat.

Gujarat needs to take lead in reducing emission intensity of its GDP and provide a roadmap for India's economy to follow based on its success.

If the commitment made by India at international forum is to be honored then India has to achieve emission intensity of 17.4 kgs. of CO₂ per thousand rupees of GDP by year 2020.

If Gujarat is to achieve national average then it has to reduce its emission intensity from 28.44 to 17.4 kgs. CO₂ per rupees thousand of GDP.



Reduction in emission intensity cannot be achieved overnight by any means and such strategies need to be well thought, long term plans. The reductions targeted for India and Gujarat are very big and they call for ***paradigm shift*** in growth strategies.

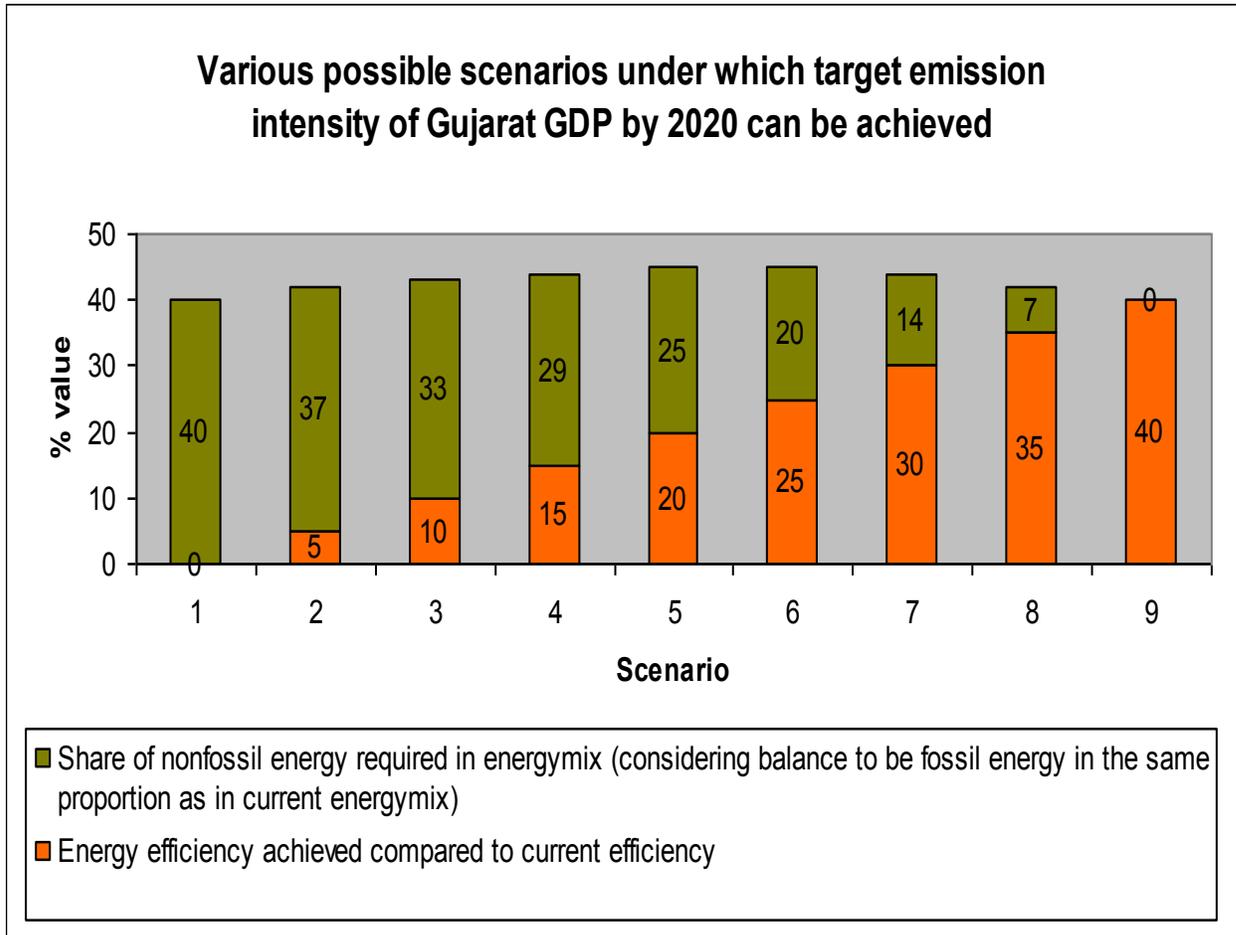
In general, any emission reduction strategy will have to be based on following three broad principles:

- Reduction in energy intensity of economy i.e. improving energy efficiency
- Reduction in emission intensity of energy mix i.e. increased use of cleaner source like gas and increased share of nonfossil energy
- Capturing of carbon dioxide emissions either at source of emissions or from the environment

Thus, essentially, reduction in emission intensity needs to be achieved by a suitable combination of use of technologies for reducing the energy intensity

and emission intensity of energy. Various possible technologies to achieve these reductions have been analyzed, in detail, by us.

However, for the purpose of planning, various scenarios; involving permutation & combination of energy and emission factors to be achieved; have been determined which can help in achieving the desired emission intensity of Gujarat GDP by 2020. These are summarized in following figure.



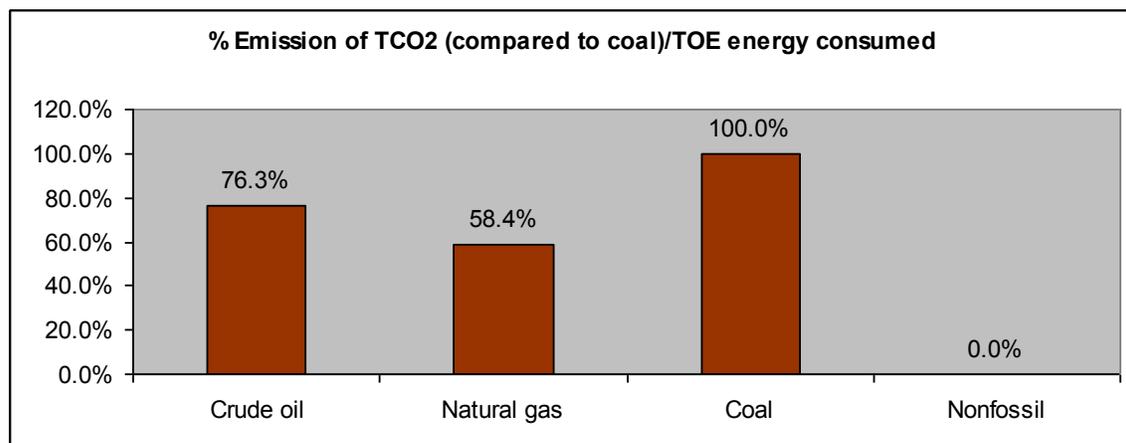
As can be seen from this figure, Gujarat economy will need to achieve 40% improvement over its current energy efficiency if it has to achieve the national average target of emission intensity of GDP by year 2020. Other possible extreme is that if no energy efficiency is achieved then the energy mix will have to have about 40% share of nonfossil energy (compared to less than 1% share today) if the balance energy is provided by fossil sources in the same proportion as current energy mix.

Major technology options for reducing energy intensity of GDP are:

- *Converting coal/oil based power plants to gas based combined cycle plant*
- *Exhaust gas recycle and/or oxy-fuel burning technology*
- *Use of VFDs in industries with varying capacity utilization in a year*
- *Use of co and tri generation technology where it is feasible*

We can target for 5-10% energy intensity reduction by these technologies.

Emission intensity of GDP depends upon the relative share of various primary commercial sources of energy i.e. **energy mix or energy basket.**



Thus, fuel switch from coal to any other source of primary energy can result in substantial reduction in emission intensity of GDP.

Gas is the least emitting energy source and increase of its share in energy mix in near future will help in substantially reducing the emission intensity.

It may be noted that if gas is used in place of coal in existing power plants, by adopting coal to gas conversion technology discussed earlier, the emission intensity can be reduced by improving both viz. energy efficiency as well as emission intensity. **Thus, if existing coal based power plant is converted to gas based combined cycle plant with advanced class gas turbines then we can achieve 65% reduction in emission intensity of GDP corresponding to original coal based emissions.**

It is a well accepted principle that unless CO2 emissions are priced at appropriate level, it will be impossible to achieve the desired emission reduction at global level. If CO2 emissions are not priced appropriately, it would not be economically competitive to use low emission intensity energy sources vis-à-vis the option of using high emission intensity energy source.

As of now only the state Government of Gujarat has taken some measures over and above Government of India initiatives. It is aggressively pursuing development of renewable energy like solar. Apart from this, Gujarat levies a Green cess of Rs.0.02 per kwh generated by thermal power plants using fossil fuels. No other state Government is known to have taken similar initiatives specifically for emission reductions.

These policy instruments and their limitations, with implied price of CO2, are analysed in following table.

Sr	Policy	Provision	Limitation	Implied Price of CO2 (US\$/T)
1	Cess on coal	Levy of Rs.50/T on every tonne of indigenous and imported coal	Lignite is not covered. Not level playing field with lignite users getting benefit though they are as emission intensive. It is a move in right direction but cost of CO2 assigned is not enough to disincentivise use of coal. Thus, this tax might only help in raising resources for Govt. without achieving the desired objective of emission reduction.	0.55
2	RPO concept	REC mechanism to develop market based scheme to promote nonfossil energy	Mechanism design is consistent with stated objective of emission reduction. However, RPO levels are too meager and even at that enforcement of RPO obligations does not appear to be adequate.	

			Thus if the regulation is not enforced strictly, it will give rise to high risk perception to investors and renewable investments will not come.	
3	PAT scheme	Specific energy consumption expressed as TOE is proposed to be reduced.	This scheme is aimed at energy efficiency only and is not recognizing the initiative to use low emission intensity energy sources. It treats all fossil fuels at par with respect to its energy content. There is no incentive for emission reduction through fuel switch. Without fuel switch India's emission intensity cannot be reduced to the extent desired.	65
4	Green cess in Gujarat	All thermal power generators are to pay at the rate of Rs.0.02/kwh	Like PAT scheme this policy does not distinguish the lower emission intensity of certain fuels and taxes them at the same rate as high emission intensity fuel. This does not create economic incentive to use low emission intensity energy. No fuel switch can be achieved through this mechanism.	0.4

If the Governments are seriously interested in achieving the stated emission intensity reduction of GDP, a very well thought out, longterm policy initiatives will be required in a comprehensive manner.

Based on the analysis carried out, it is very clear that unless policy aims at achieving emission reduction through fuel switch, the desired emission intensity of GDP cannot be achieved.

Thus, the fundamental objective of the policy should be to encourage emission intensity reduction through instruments which will make economic sense for fuel switch alongwith achieving energy efficiency.

The policy instruments devised will have to be of two types:

1. To address emissions from power generation
2. To address emissions from industry/ commercial sectors

The mechanism of RPO in case of power with commercial structure of REC appears to be a sound policy initiative to encourage nonfossil based energy sources. If the same principle is extended to encourage fossil fuels with lesser emission intensity, it will go a long way to encourage power generation from fossil fuels like gas which can substantially lower the emission intensity.

Accordingly, **a policy can be made wherein minimum gas based power generation is obligatory and accordingly the concept of GPO (gas based power purchase obligation) is introduced on the lines of RPO.** In order to make GPO effective, a market mechanism on the lines of REC should be introduced and GEC certificates should be introduced to allow entities to fulfill their GPO obligations if they are not able to generate gas based power to the required extent. Such a mechanism will go a long way in encouraging investments in gas based power generation and help in achieving the desired emission intensity reduction even at high growth rates.

Further, to provide confidence to investors in gas based power, a 20-30 year vision in terms of overall GPO obligations, yearwise, should be announced and all state Regulators in power sector should be asked to enforce such GPO obligations along with RPO obligations.

Carbon tax is seen as an additional tax and unless it is imposed at a rate which offsets costs of lesser emission intensity options, it will not result in any reduction in emission intensity of GDP and it will only become an additional revenue source for Government. Cap and trade mechanism will involve complex calculations in terms of allowable emissions from various sectors and it will be a very difficult task to implement an agreed structure and related market mechanism with the consent of all stakeholders.

In view of this, it is felt that the Government should introduce the concept of Corporate tax rate (including MAT rate) linked to emission intensity of the gross turnover of the industry or commercial activity. The underlying principle would be that if the activity results in emission intensity less than desired emission intensity of GDP, it will be taxed at lower rate than the average tax rate, if the activity is having emission intensity equal to desired

rate for GDP it will be taxed at normal rate and if it exceeds the desired intensity than it will be taxed at higher than normal corporate tax rate.

The abovementioned policy initiatives especially GEC and corporate rate structure can only be taken at central Government level and state cannot do much about it.

However, states like Gujarat can consider taking proactive measures at state level on similar lines to demonstrate efficacy of such policy and strong commitment towards “Sustainable Development Policy”.

The policy measures which the state can take are as follows:

1. Stipulate targets for RPO in aggressive manner so as to increase share of nonfossil energy in Gujarat basket (which is very low at present due to lack of hydro potential in Gujarat)
2. Introduce the concept of GPO as outlined above and create an environment to support investments in gas based power generation projects
3. Modify the scheme of ‘Greencess’ levied on thermal power generation by making it a broadbased tax related to emission intensity of all economic activities. The structure of such cess could be similar to Corporate tax structure suggested above. The ‘Greencess’ could be a turnover linked cess as follows:
 - The high energy intensity sectors like Steel, Aluminium , thermal power and Cement would have normal ‘Greencess’ rate of 1% of gross turnover. In order to incentivize low emission intensity thermal power based on gas, there would be no Greencess levied on gas based power generation. However, in order to incentivize their emission reduction initiatives, the ‘Greencess’ applicable would be linked to the improvement in their emission intensity performance. Thus, Greencess in any year “n” would be computed as follows:

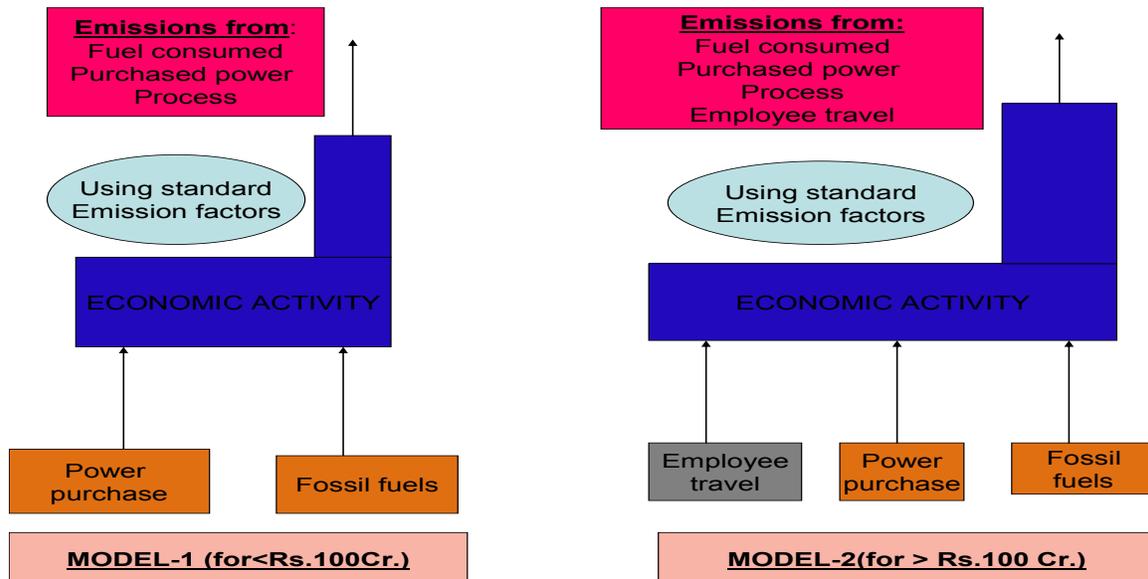
$$(Greencess)_n = (Greencess)_{n-1} * (emis.int.)_n / (emis.int.)_{n-1}$$

However, in case if a company’s emission intensity remains unchanged or increases in year “n” compared to year “n-1”, then the ‘Greencess’ rate would go up by 1% compared to previous year’s applicable rate (subject to maximum of 5%).

- All the companies exempted from statutory audit requirements will be taxed at normal rate of 1% of gross turnover.
- In all other cases, ‘Greenness’ rate would be computed as follows:

(Greenness rate)_n = 0.057(Emission int.)_n ; as % of gross turnover; subject to max. of 5%. (This formula assumes that at desired emission intensity of 17.3, the Greenness rate would be 1% of turnover). (where emission intensity is in kgs. CO₂/Rs. 000 turnover)*

The administrative requirements of monitoring emissions would be based on following two models. As can be seen, these models envisage using data from financial statements and internationally accepted standard emission factors, and it will not require any elaborate mechanism that would, otherwise, be required in schemes like ‘Cap and trade’.



As can be seen from above, the companies will not have to be burdened with new data collection as it will be based on the figures from audited accounts for any year’s performance. Only in case of large companies with turnovers in excess of Rs.100 crores additional data in the form of employee travel will have to be maintained so as to be able to use standard emission factors used internationally to calculate GHG emissions.

Essentially, the proposal suggests that for all companies having turnover less than Rs.100 crores, will have to calculate their emissions as per Scope-1 &2 of GHG Protocol. In case of companies with turnover in excess of Rs.100

crores, in addition to Scope-1&2 emissions, data on emissions from travel related Scope-3 emissions will have to be calculated.

Such a policy would help in developing the culture of measurement, reporting and monitoring of emissions from economic activities, which is very necessary to achieve reduction in emission intensity of GDP.