

# UNITED STATES OF AMERICA NUCLEAR REGULATORY COMMISSION

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INFORMATION ADMINISTRATION (EIA) ANNUAL ENERGY OUTLOOK

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NUCLEAR REGULATORY COMMISSION

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BRIEFING ON ELECTRICITY FORECAST FROM  
ENERGY INFORMATION ADMINISTRATION (EIA)  
ANNUAL ENERGY OUTLOOK

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PUBLIC MEETING

Nuclear Regulatory Commission  
One White Flint North  
Rockville, Maryland

Wednesday, June 8, 1994

The Commission met in open session,  
pursuant to notice, at 10:00 a.m., Ivan Selin,  
Chairman, presiding.

COMMISSIONERS PRESENT:

IVAN SELIN, Chairman of the Commission  
KENNETH C. ROGERS, Commissioner  
FORREST J. REMICK, Commissioner  
E. GAIL de PLANQUE, Commissioner

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## STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE:

WILLIAM C. PARLER, General Counsel

JOHN HOYLE, Acting Secretary

DR. JAY E. HAKES, Administrator, EIA

MARY J. HUTZLER, Director, Office of Integrated  
Analysis and Forecasting, EIA

SCOTT B. SITZER, Director, Energy Supply and  
Conversion Division, EIA

ROBERT T. EYNON, Chief, Nuclear and Electricity  
Analysis Branch, EIA

J. ALAN BEAMON, Team Leader, Electric Utility and Non-  
Utility Analysis, EIA

JAMES HEWITT, Economist, Nuclear and Financial  
Analysis

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P-R-O-C-E-E-D-I-N-G-S

10:00 a.m.

CHAIRMAN SELIN: Good morning, ladies and gentlemen.

We're pleased to welcome the representatives of the Energy Information Administration to brief the Commission on the EIA forecast of electricity supply and demand through the year 2010. Mr. Hakes, the Administrator, Ms. Hutzler, the Director of Integrated Analysis and Forecasting and Mr. Eynon, the Chief of the Nuclear and Electricity Analysis Branch will give the presentations.

The EIA develops and publishes assessments of the long-term outlook for international energy markets. These assessments are used by decision makers and energy analysts in the public and private sectors. They provide a valuable service. We at the Commission follow these really quite closely.

We're pleased to have you here today. We also noticed that your forecasts are for a lower rate of energy growth than any across the board and I'm sure along the way you'll explain this. Usually you try to find somebody on the left and somebody on the right for some shelter, but I guess we commend you on

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1 your intellectual courage for just saying what you  
2 think.

3 Copies of the viewgraphs are available at  
4 the entrances to the room.

5 Commissioners?

6 COMMISSIONER REMICK: Nothing.

7 CHAIRMAN SELIN: Mr. Hakes?

8 DOCTOR HAKES: Thank you, Mr. Chairman.

9 The projections that we're presenting  
10 today are based on the National Energy Modeling  
11 System, which is a new system that we've brought on-  
12 line this year and has been developed in the last few  
13 years with some advice from the National Research  
14 Council. This is a model that provides a 20 year time  
15 horizon. It provides an integrated supply and demand  
16 and conversion system and it does provide for regional  
17 representation. It's a powerful model in that it has  
18 many powerful levers that allow us to do "what if"  
19 scenarios and it also, of course, features the major  
20 drivers like the growth in the economy and oil prices.

21 We have to add the usual caveats that come  
22 with these kinds of models. They do not predict the  
23 future in certain important respects. We, for  
24 instance, freeze policy as of October 1, 1993. It's  
25 likely that we will continue to see policy changes

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1 that will impact these numbers, but we cannot  
2 anticipate those in this kind of model.

3 (Slide) If I could have the second slide.

4 These are the issues that we thought you  
5 would be interested in today, the assumptions, the  
6 national electricity supply, regional electricity  
7 review and uncertainties. I have with me, as you  
8 suggested, Mary Hutzler and Bob Eynon to help in this  
9 briefing.

10 (Slide) If I could have chart number 3,  
11 we would start to get into the substance.

12 At the base of a lot of what we do is the  
13 world oil price. This is a difficult area, as you  
14 would know from previous forecasts over the years.  
15 But we basically show that in the year 2010 in real  
16 dollars, the price of a barrel of oil would be \$28.00.  
17 We have a range there from a low case scenario to a  
18 high case of about \$20.00 to \$34.00. We show most of  
19 the increase in price coming after the turn of the  
20 century.

21 The reason we have provided price ranges  
22 is there's a lot of uncertainties here. We don't know  
23 how aggressive conservation will be. We don't know  
24 how vigorously OPEC will expand its capacity and we  
25 don't know for sure what kind of production might

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1 occur outside of OPEC. So, all of these factors can  
2 move the numbers higher or they can push them lower.

3 CHAIRMAN SELIN: And Doctor Hakes, what's  
4 the role of the gas price? Is that a derived from the  
5 oil price or is that an independent projection?

6 DOCTOR HAKES: There's some relationship  
7 because they can't compete in certain ways, but in  
8 some ways they don't compete and it's not as close a  
9 relationship as we've shown in the past.

10 MS. HUTZLER: But it is derived  
11 independently. Obviously you have associated gas and  
12 non-associated gas. So, on the associated side, there  
13 is some dependencies there. But it is derived  
14 independently and we do look at additional capacity  
15 that needs to come on, so the delivered price forecast  
16 for gas includes those factors.

17 CHAIRMAN SELIN: And for each of the oil  
18 prices, do you look at an appropriate range of prices  
19 for natural gas?

20 MS. HUTZLER: There's a different price  
21 that's calculated for each of the different world oil  
22 prices and it's determined within the model based on  
23 the factors of how much demand you have for gas, how  
24 much new pipeline capacity you might need and how much  
25 gas you produce.

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1 CHAIRMAN SELIN: So you don't posit a  
2 range of prices for natural gas. At each oil price  
3 there is, for each year, a price for natural gas in  
4 the model?

5 MS. HUTZLER: That's correct.

6 CHAIRMAN SELIN: I see. Okay.

7 DOCTOR HAKES: Yes. The two drivers that  
8 we do the ranges for are the economic growth and oil.  
9 Of course we can do scenarios on other factors.

10 (Slide) If I could have the next chart,  
11 please.

12 These are the economic growth assumptions  
13 that go into this analysis. As you can see, the  
14 growth rates are going down as we go on each decade.  
15 I think this is generally -- we work with the DRI  
16 model in developing these economic forecasts. They  
17 are not exactly the same as the DRI model because we  
18 do factor in influences from world oil prices. But  
19 these are pretty conventional assumptions and we do  
20 have the ranges of high and low growth.

21 (Slide) If I could have the next one.

22 This is another way basically of  
23 presenting the same information. You can see the  
24 numbers there. For the 1990s we show a reference  
25 growth rate of 2.1 percent. Obviously this year is

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1 well above that. That would be for the forecast  
2 period from 1990 to 2010.

3 (Slide) Okay. If I could have the next  
4 slide.

5 Most of these charts are from our Annual  
6 Energy Outlook which we publish each year. I believe  
7 that this chart is not and I always like to warn when  
8 it's not a zero based graph. But this shows the  
9 relationship between the growth of the economy, the  
10 growth of primary energy, carbon emissions and  
11 population. I think it's quite helpful. Basically  
12 the difference between energy growth and economic  
13 growth would be energy efficiency and to some extent  
14 shifts in the industrial sector where we are perhaps  
15 doing less heavy manufacturing and more information  
16 technology.

17 CHAIRMAN SELIN: As I remember, if you had  
18 shown the growth in electricity, that would be between  
19 the energy line and the GDP line.

20 DOCTOR HAKES: Yes.

21 CHAIRMAN SELIN: In other words, a larger  
22 share of energy is electrified over time.

23 DOCTOR HAKES: Yes. And then the  
24 difference between carbon growth and primary energy  
25 growth would be nuclear and hydro and other non-carbon

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1 emitting sources of energy. Population is just on  
2 there to give again sort of another frame of reference  
3 to compare against. You will see that we do not  
4 anticipate a stabilization of carbon emissions based  
5 on the factors that we're currently including. But as  
6 I say, the policy initiatives were frozen as of last  
7 October.

8 (Slide) The next slide breaks out the  
9 same factor, energy intensity, which was part of the  
10 previous slide and looks at the industrial sector  
11 where we're able to look at this in some depth. One  
12 of the striking features in recent energy history has  
13 been the improved intensity within the industrial  
14 sector and we do project that that continues to go  
15 down. This is the major explanation for why the lines  
16 diverge between energy consumption and economic  
17 growth.

18 COMMISSIONER REMICK: Could we go back --  
19 excuse me -- that slide. I'm not sure, the thousand  
20 BTU per 1992 dollar, but for what purpose? Consumed  
21 in industry? There's something I'm missing there.

22 DOCTOR HAKES: Right. For dollar of  
23 output, how many BTUs did it take per dollar of  
24 output.

25 COMMISSIONER REMICK: Okay. For

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1 industrial.

2 DOCTOR HAKES: Yes.

3 COMMISSIONER REMICK: Okay.

4 DOCTOR HAKES: Just parenthetically, one  
5 of the real issues now for the global warming analysis  
6 is what kind of intensities are going to be achieved  
7 in the developing nations that are achieving very  
8 rapid growth and we are coming out with some work on  
9 that in another couple weeks.

10 (Slide) The next slide on the  
11 relationship between electricity sales and economic  
12 growth rates is one that I think you might have some  
13 interest in as well as some questions. They show that  
14 even with relatively stable prices that electricity  
15 will not grow as fast as it has in the past. Back in  
16 the early '70s you have an electricity growth rate of  
17 over seven percent and well above the economic growth  
18 rate. Basically from the mid-'80s to the present you  
19 have a situation where the growth of the economy and  
20 the growth of electricity have run fairly parallel.  
21 What makes these lines start to diverge is things like  
22 the appliance efficiency standards under the Energy  
23 Policy Act of 1992 and previous legislation, growth  
24 and demand side management programs, and these are  
25 both having quite heavy impacts in the residential and

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1 commercial sectors. Lighting is clearly a big factor  
2 in the commercial sector. In refrigerators, there is  
3 tremendous growth. In the next few years, the minimum  
4 required refrigerator will be 52 percent more  
5 efficient than the -- was it the average on the market  
6 or the best on the market? I don't have that exact  
7 number, but the efficiency gains in refrigerators are  
8 of the magnitude of 50 percent.

9 CHAIRMAN SELIN: That raises an  
10 interesting question. Normally when you look at price  
11 and volume you get a J curve that in the short-term  
12 demand for anything, whether it's electricity in  
13 kilowatt hours or cars or what have you is sort of  
14 independent of price. So, if you drop price, the  
15 demand doesn't go up as fast as the price drops. If  
16 it's exports and your currency is devalued, you just  
17 have fewer dollars. But in the long run, people use  
18 more of something as the price goes down. Now, maybe  
19 demand for refrigeration is sort of independent of  
20 kilowatt hours, but I would think in the commercial  
21 sector and maybe even in the residential sector as the  
22 efficiency and the price goes down in terms of  
23 kilowatt hours, people would electrify more than they  
24 would otherwise do you and you would see after a few  
25 years that the electricity growth would, in fact, pick

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1 up again because a whole lot of things become  
2 efficient to do with electricity when you have these  
3 higher efficiencies that you would not normally do  
4 with electricity.

5 First, is that right? Second, insofar as  
6 it's right, does the model catch this or do you --

7 DOCTOR HAKES: That's a very good analytic  
8 point because if you look at what happened in the  
9 automobile sector as you had the efficiency of gains  
10 people drove more.

11 CHAIRMAN SELIN: Right. Okay. That's a  
12 simple way --

13 DOCTOR HAKES: Yes.

14 CHAIRMAN SELIN: Clear way of putting it.

15 DOCTOR HAKES: That's an important  
16 analytic question and one that we've looked at and  
17 tried to take into account. The home, of course,  
18 you'd have to replace natural gas to have a strong  
19 impact there.

20 CHAIRMAN SELIN: Well, you would have, I  
21 would think, a higher percentage and new homes would  
22 have electricity given these high standards than would  
23 otherwise. People make -- developers make decisions  
24 as to whether new homes will be electrified or use  
25 gas, or is that too small an effect to --

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1 DOCTOR HAKES: The other side of the coin  
2 is there have been for a long period of time  
3 restraints on the use of natural gas for home heating,  
4 for instance. So, in the last survey we did, there  
5 was actually growth in natural gas.

6 MS. HUTZLER: In fact, we're not seeing  
7 that so much recently, that is switching heating  
8 fuels. For instance, in the Northeast we thought that  
9 oil would actually go down, also in the Mid-Atlantic  
10 States for heating. In fact, our most recent survey  
11 has shown that new homes are still being heated with  
12 oil in the Northeast and that in the Middle Atlantic  
13 Region that oil is still maintaining its share. So,  
14 we, in our recent date, have not seen the shift into  
15 electricity for heating fuel.

16 CHAIRMAN SELIN: Even though efficiency --  
17 relative efficiencies of electricity compared to the  
18 direct burning of oil or gas is improving or has it  
19 not improved yet?

20 MS. HUTZLER: Is that improving? I don't  
21 think it is.

22 MR. BEAMON: Gas and oil furnaces are all  
23 so extremely efficient. I don't think that they're  
24 improving. The shift from your average gas or oil  
25 furnace right now to a new one is a big jump in

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1 improvement and efficiency also.

2 CHAIRMAN SELIN: So, it's not just  
3 electrical efficiency that's improved. Having taken  
4 the wind out of my sail, I still want to ask you the  
5 methodological question, which is would your model  
6 catch this? In other words, would demand for  
7 electricity depend on efficiencies or is that just  
8 fixed?

9 MS. HUTZLER: It's not fixed. We do show  
10 efficiency improvements over time and, in fact, that's  
11 how we represent the golden carrot program for  
12 refrigerators and that sort of thing. But you do get  
13 saturation of refrigerators. People may have two  
14 refrigerators in their home, but they're not going to  
15 have ten just because it gets more efficient. Of  
16 course there are other uses for electricity, such as  
17 the whole PC area that we have going on.

18 CHAIRMAN SELIN: Yes, but they don't  
19 depend much on price either. I would think that new  
20 houses, commercial applications, industrial  
21 applications would be very sensitive to efficiency,  
22 that within a given house --

23 MR. BEAMON: In markets where there are  
24 dual fuel competition, heating and air conditioning  
25 especially, there are electric and gas represented and

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1 the relative prices of them are compared in the model  
2 and it makes those choices.

3 CHAIRMAN SELIN: Yes. And you're saying  
4 in such markets it's not just electricity that's  
5 improving in efficiency but all fuels?

6 MR. BEAMON: All fuels.

7 COMMISSIONER REMICK: I was a little  
8 surprised by the spread you predict also because of  
9 the continuing increase in recent years toward greater  
10 electrification in industrial applications. Now, you  
11 show that the increase in efficiency is apparently  
12 going to overcome that, but what indications have we  
13 that that's the case? Are you predicting less  
14 conversion to electrical use in industrial  
15 applications and is it certainly in evidence? In  
16 other words, electricity growth and TDP --

17 MR. BEAMON: I think later that Mary is  
18 going to talk about it. But amongst the end use  
19 sectors, industrial is growing fairly close to GDP.  
20 In terms of electricity, we'd expect to continue to  
21 see electrification in the industrial sector. It's  
22 declines in the residential and commercial sectors  
23 that are bringing this gap across, not in the  
24 industrial sector.

25 MS. HUTZLER: And that's mainly due to the

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1 Energy Policy Act and to the National Appliance Energy  
2 Conservation Act. Now, I think two years ago when we  
3 briefed you we had a growth rate for electricity about  
4 1.9 percent, which is right under the GDP.

5 CHAIRMAN SELIN: Right.

6 MS. HUTZLER: And at that time I think we  
7 told you we were evaluating EAct and that that rate  
8 would come down because of the standards and if you've  
9 got improved appliances out there that people need to  
10 purchase when they turn over their stock and we do  
11 have a stock turnover in the model. We don't assume  
12 that's going to happen right away. We do it based on  
13 what historically has happened. That we would see a  
14 smaller growth rate for electricity and I think in AEO  
15 '93 we had a 1.6 percent growth rate.

16 But what had happened at that time was we  
17 didn't put in efficiency improvements in future years  
18 beyond what we knew about --

19 CHAIRMAN SELIN: We saw a one step  
20 improvement and then a couple years ago you just had  
21 assumed efficiencies would stay constant. Here you  
22 certainly keep getting better and better.

23 MS. HUTZLER: Yes, because we didn't know  
24 exactly what the mandated efficiency standards would  
25 be in the legislation. They just say in future years,

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1 for instance 1998, there would be improvements, and we  
2 needed to get more studies as to what those rates  
3 would be. I think Lawrence Livermore Laboratory came  
4 out with some rates and we've picked up on those. So,  
5 that's brought the electricity growth rate down  
6 further.

7 CHAIRMAN SELIN: Just a fairly minor  
8 question, but is there any evidence that stock turns  
9 over faster as efficiencies improve? I mean is there  
10 any correlation between how -- do people trade in  
11 their refrigerators faster if the efficiency is much  
12 higher?

13 MS. HUTZLER: I don't believe we've seen  
14 any of that.

15 Alan, do you know if --

16 MR. BEAMON: That's certainly what  
17 utilities are pushing for in some of their DSM  
18 programs that are aimed at retrofit market, not the  
19 new market. I mean they're going after them, picking  
20 up old refrigerators and getting them to trade them  
21 in. So, there's some of that happening.

22 MS. HUTZLER: But I don't think we've  
23 picked that up in the data yet because our consumption  
24 surveys go on every three years. So, we may be seeing  
25 more of that as we get more data in.

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1 CHAIRMAN SELIN: This is really quite a  
2 spectacular change since two years ago, the divergence  
3 between the rate of electricity growth and GDP growth.

4 COMMISSIONER REMICK: Or a dramatic change  
5 from the situation today.

6 MS. HUTZLER: Yes.

7 DOCTOR HAKES: One other assumption that's  
8 built into this is we do have data reported to us by  
9 utilities on plans for demand side management programs  
10 and we project by the year 1997, I believe, that those  
11 expenditures will run about \$4 billion. Those are the  
12 numbers that have been reported to us.

13 COMMISSIONER REMICK: That's an  
14 interesting subject too with the competitiveness in  
15 the utility industry. How willing are people going to  
16 be able to put those costs -- the ratepayers paying  
17 for those costs, how willing are they going to be to  
18 put those in when they're competing with other  
19 utilities who perhaps do not have to introduce those  
20 demand side management efforts which run the cost up  
21 to the customer?

22 DOCTOR HAKES: That's a dynamic element in  
23 this process. Of course once in which there will be  
24 probably some policy input.

25 CHAIRMAN SELIN: Commissioner Remick has

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1 put it as a question, but I'll make it as affirmative  
2 statement. I think utilities are going to do a lot  
3 less than they say they're going to do in demand side  
4 management.

5 DOCTOR HAKES: That's why I wanted to  
6 point out that assumption.

7 MR. BEAMON: Your generating utilities  
8 might, but you might see the move go to your T&D  
9 utilities. They may become the efficiency people.

10 CHAIRMAN SELIN: The guys who will still  
11 keep monopolies.

12 MR. BEAMON: They'll still be regulated  
13 and still be -- and so it will move away from your  
14 generating companies.

15 COMMISSIONER ROGERS: There's quite a  
16 great deal of fine structure in these results out  
17 after the year 2000. Can you give any comments --

18 CHAIRMAN SELIN: The Republicans come  
19 back, you see.

20 COMMISSIONER ROGERS: I beg your pardon?

21 CHAIRMAN SELIN: The Republicans come  
22 back.

23 COMMISSIONER ROGERS: Can you remark on  
24 some of these bumps and jags in the curve? I mean the  
25 one that catches my eye particularly is at about 2009.

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1 What happens there? Something dramatic must have  
2 happened or expected to happen. What is it? Do you  
3 know?

4 MS. HUTZLER: No, we don't know right now.  
5 We usually look at these in five year periods and only  
6 look at 2005 to 2010. So, we'll have to get back to  
7 you with that answer.

8 COMMISSIONER ROGERS: I mean something  
9 clearly is happening out there near the end there  
10 around 2009 that suddenly the GDP takes off and  
11 electricity is dropping.

12 DOCTOR HAKES: We're not assuming cold  
13 fusion.

14 CHAIRMAN SELIN: Your consistency checks  
15 really look at rolling averages though, don't they, as  
16 opposed to year to year?

17 DOCTOR HAKES: Yes. We do a short-term  
18 forecast that goes out about two years into the future  
19 where we try to fine tune historic events and things  
20 like that. A model of this sort takes a lot to change  
21 its direction.

22 COMMISSIONER ROGERS: That's why it's  
23 interesting.

24 DOCTOR HAKES: (Slide) I think the next  
25 chart will show, as well, some of the uncertainties in

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1 this area and some of our thinking. I apologize for  
2 using a non-zero based chart because I think  
3 graphically it sort of over exaggerates a little bit.  
4 But let me walk through this.

5 The top line is what residential energy  
6 consumption would be if you froze 1991 technology.  
7 The next line below that reflects our reference case  
8 which is our principal projection and how much less  
9 residential energy consumption will be based on the  
10 factors that we have just been discussing, like the  
11 appliance efficiency standards. The bottom line is  
12 what would happen if people bought the most efficient  
13 appliances that were on the market. What we've done  
14 is used -- that's based on appliances that are already  
15 available with the exception of refrigerators where by  
16 law efficiency gains will have to be occurring during  
17 the period.

18 The difference between the top line and  
19 the second line in 2010 is about a ten percent  
20 reduction in residential energy consumption. The  
21 difference between the top line and the bottom line is  
22 about a 25 percent reduction. Now, this is not to say  
23 that there would be much likelihood that the bottom  
24 line could occur, but it's fairly conservative in its  
25 assumptions about technology and it does provide a way

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1 in which demand side managements might interact with  
2 appliance efficiency laws to reduce from what we  
3 projected. Obviously our best guess is the projection  
4 at this point. But there's room both at the top side  
5 and the bottom side for movement from that projection.

6 CHAIRMAN SELIN: This best case assumes  
7 that stock is replaced at the same rate for all three  
8 curves, but it's replaced by better technology. So,  
9 there's an even better case which is that the  
10 utilities can get people to replace stuff that's still  
11 serviceable just because the operating cost would be  
12 low.

13 DOCTOR HAKES: Correct.

14 CHAIRMAN SELIN: And if you drew fuel  
15 shares, is there any difference in the mix between --

16 DOCTOR HAKES: (Slide) That's the next  
17 slide. We anticipated that that question might arise.  
18 One can see that the efficiency potentials exist  
19 really both for electricity and natural gas. A lot of  
20 the same work on the appliance side that goes on on  
21 the electric appliances occurs on gas appliances as  
22 well. These savings are cumulative over the whole  
23 period. They're not annual savings by any stretch.  
24 But it shows -- in this case the bottom line would be  
25 the frozen technology. The darkest bars would be

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1 the -- what we're projecting and the red bar would be  
2 the best technology.

3 CHAIRMAN SELIN: So turn it around the  
4 other way. The electricity share would actually be  
5 larger than -- I mean the electricity share would be  
6 larger in the best case because there'd be even  
7 greater savings in gas than in electricity.

8 DOCTOR HAKES: There's more room at this  
9 point for efficiency gains.

10 CHAIRMAN SELIN: Yes. What does that  
11 mean?

12 DOCTOR HAKES: Pardon?

13 CHAIRMAN SELIN: Does that mean yes?

14 DOCTOR HAKES: Yes, more opportunities for  
15 gas.

16 CHAIRMAN SELIN: Oh, okay.

17 DOCTOR HAKES: (Slide) The next chart on  
18 prices, I think, relates to your previous question  
19 about the impact of prices because we are showing  
20 quite -- I think it's dramatic and sort of the  
21 stability of prices. Now, these are constant dollars.  
22 So, these would be increases above inflation. But  
23 over the forecast period, electricity would  
24 demonstrate the slowest rate of growth. Natural gas  
25 would be at the highest rate. Someone might argue,

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1 "Well, you're burning these fuels to create  
2 electricity," but as you're aware the fuel cost is not  
3 the major cost in the production of electricity.

4 CHAIRMAN SELIN: I've got a lot of  
5 questions on this.

6 DOCTOR HAKES: Yes, I thought you might.

7 CHAIRMAN SELIN: First of all, the coal  
8 guys have just come up with a coal impartial study  
9 that shows that it's always going to be cheaper to use  
10 coal to generate electricity than to use gas. Are  
11 they assuming an even faster growth in natural gas  
12 prices than is here? Do you know what I'm talking  
13 about?

14 MS. HUTZLER: I haven't seen that study.

15 CHAIRMAN SELIN: It's a study that was  
16 reported in --

17 MR. BEAMON: I think it's coal  
18 productivity. They're assuming coal prices go down.

19 CHAIRMAN SELIN: I see. But they also  
20 looked at a range of natural gas prices that were  
21 pretty hefty increases from today. This 1.7 percent  
22 a year growth in natural gas, which is pretty hefty,  
23 would other people predict an even faster growth in  
24 natural gas prices? How do your projections of gas  
25 prices compare?

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1 DOCTOR HAKES: The gas industry projects  
2 a lower growth.

3 CHAIRMAN SELIN: What about the other four  
4 or five one year reports compared to your overall  
5 results with four or five projections?

6 MS. HUTZLER: We're about in the range of  
7 other projections for gas prices.

8 CHAIRMAN SELIN: On gas prices?

9 MS. HUTZLER: Yes. But I'm not familiar  
10 with the coal study you're talking about, so I don't  
11 know how to compare that.

12 CHAIRMAN SELIN: Well, I only saw a report  
13 of it in the Energy Daily. I didn't actually see the  
14 study.

15 The second is -- I'm sure you have this  
16 later on, but the fuels that are used to produce  
17 electricity, do you have a curve later on for what  
18 share comes from gas as opposed to coal?

19 MS. HUTZLER: We show generation and  
20 capacity additions, but I don't --

21 CHAIRMAN SELIN: Is that very sensitive?  
22 Is that very sensitive to the relative price of the  
23 fuels? I mean gas price has got to be really an  
24 important consideration.

25 MS. HUTZLER: It is.

1 MR. BEAMON: It's important, but you've  
2 got an enormous embedded stock of coal. It's not  
3 going to get rid of that. So, you can't change the  
4 share very much when coal is already 50 some percent.

5 MS. HUTZLER: But we do bring a lot of new  
6 gas plants on.

7 CHAIRMAN SELIN: But if you look at the  
8 increments.

9 DOCTOR HAKES: Right. If you just look at  
10 the increments, it's very sensitive to totals.

11 CHAIRMAN SELIN: Okay. And the third is  
12 I guess it goes back to your assumptions. What have  
13 you assumed about competition in the electricity  
14 industry when you've looked at these prices in terms  
15 of wheeling, wholesale wheeling, retail wheeling,  
16 unlimited wheeling? What are the assumptions on the  
17 electricity market?

18 MS. HUTZLER: We do look at non-utility  
19 producers and estimate their cost and where it's  
20 economic we will have them being the marginal supplier  
21 of electricity. We do have some interregional power  
22 sales. But on wheeling itself, do we --

23 CHAIRMAN SELIN: I guess my real question  
24 is as long as you have a cost-based basis for  
25 electricity prices, they're going to go up pretty

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1 fast. If you get real market competition for  
2 electricity, you would think that would --

3 MR. BEAMON: We're still at this point  
4 dealing with a cost-based system.

5 CHAIRMAN SELIN: So, if you did this over  
6 next year, it might be an even slower growth in  
7 electricity prices.

8 MR. BEAMON: It potentially would be  
9 slower depending on what you did with the transition  
10 cost.

11 CHAIRMAN SELIN: There are a whole lot of  
12 folks that are already starting to write off an  
13 electrical generator, starting to write off capital  
14 costs a lot faster than they were doing already, which  
15 presumably would lead to lower prices and more  
16 competitive prices.

17 MS. HUTZLER: That's true.

18 CHAIRMAN SELIN: So, you haven't assumed  
19 market -- I mean is this new kind of a more efficient  
20 electricity market having an impact on electricity  
21 prices yet?

22 MS. HUTZLER: Not in terms of the pricing  
23 algorithm.

24 CHAIRMAN SELIN: Well, therefore, going  
25 back to the economic argument, if electricity prices

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1 actually feel in real terms, would your model show  
2 more electrical use or is it pretty inelastic?

3 MS. HUTZLER: It would show more, but I  
4 don't think it would be a lot additional. It would be  
5 some additional, mainly because of the slow stock  
6 turnover in the other industries and that kind of  
7 thing.

8 CHAIRMAN SELIN: Okay.

9 DOCTOR HAKES: (Slide) The next chart is  
10 on electricity sales. It repeats some of the  
11 information presented before, but it shows the  
12 variation that would be foreseen based on different  
13 rates of economic growth. In our high economic growth  
14 scenario we would show the rate being 1.5.

15 CHAIRMAN SELIN: That's the rate of growth  
16 of electricity?

17 DOCTOR HAKES: Yes.

18 CHAIRMAN SELIN: And what's the rate of  
19 growth of the economy in the high --

20 MS. HUTZLER: 2.4.

21 CHAIRMAN SELIN: And for the other two  
22 cases?

23 MS. HUTZLER: The economy is 2.1 for the  
24 reference case and 1.8 for the low.

25 CHAIRMAN SELIN: So, you have a fixed

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1 ratio of electrical growth and economic growth or do  
2 they just scale up in proportion?

3 MS. HUTZLER: That's not how we represent  
4 it though.

5 CHAIRMAN SELIN: I mean it works out that  
6 way?

7 MS. HUTZLER: Yes. Right, exactly.

8 CHAIRMAN SELIN: Okay.

9 DOCTOR HAKES: Let's see. Do I have one  
10 more?

11 MS. HUTZLER: Yes.

12 DOCTOR HAKES: (Slide) Yes. The final  
13 chart in my part of the presentation --

14 CHAIRMAN SELIN: I'm sorry. What I said  
15 is wrong. Between a low and a high you have a 33  
16 percent difference in the economic growth rate and you  
17 have a 50 percent difference in the electricity growth  
18 rate. So, electricity grows relatively faster in the  
19 high growth model than in a low growth model.

20 MR. BEAMON: In the industrial sector  
21 that's driving it.

22 CHAIRMAN SELIN: So, that basically  
23 supports the point Commissioner Remick made earlier.  
24 Okay.

25 DOCTOR HAKES: The last chart in my

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1 section shows the various sector demands for  
2 electricity. Industrial in the year 2010 will be the  
3 largest sector with 38 percent. Residential will be  
4 31 percent and commercial 30 percent. There's an  
5 additional factor here that while small may be of some  
6 analytic interest, we're showing 1.6 percent for the  
7 transportation sector.

8 CHAIRMAN SELIN: It's now electrical cars.

9 DOCTOR HAKES: Yes. And if you'd like, we  
10 can share with you assumptions about price and range  
11 and things like that in which this was based. We are  
12 actually showing when it comes to all alternative fuel  
13 cars that ten percent of the new cars sold in the year  
14 2005 will be alternate fuel vehicles. That's based  
15 mainly on policy decisions that are already in the  
16 works or already in force. We have tried to break  
17 that down. Some people have suggested we shouldn't  
18 have tried to do that, but try to break it down into  
19 the different kinds of vehicles and the major  
20 alternate fuel vehicles would be natural gas and some  
21 form of electric.

22 CHAIRMAN SELIN: Do you have a curve  
23 someplace that shows baseload and peak capacity that  
24 goes with these consumptions? Do they go up just in  
25 tandem or is the ratio of average to peak improved as

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1 you go to electrical vehicles and things like that  
2 that use presumably off-hour charging?

3 MR. BEAMON: We don't have a curve, but  
4 the curve flattens just slightly over time. The  
5 penetration is not big enough to move it too much.

6 CHAIRMAN SELIN: And what about the  
7 other -- I mean all these demand side managements. Is  
8 there an improvement in general in the electrical  
9 industry in terms of --

10 MR. BEAMON: It depends on who you talk  
11 to. Some of the curves apparently and recently have  
12 been actually getting steeper rather than flatter.  
13 But generally we'd expect some flattening. One, the  
14 growth in the industrial sector growing faster  
15 relative to other sectors is going to flatten the  
16 curve because it would tend to be more level curves  
17 there.

18 CHAIRMAN SELIN: And the second thing is  
19 I would assume that the three sectors have different  
20 elasticity to price, that residential would be pretty  
21 much fixed and industrial would be quite sensitive to  
22 price or is that not --

23 MR. BEAMON: True.

24 CHAIRMAN SELIN: So, someplace, although  
25 you don't have them here, you would have curves like

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1 this for each of the three cases? You have three  
2 economic cases.

3 MS. HUTZLER: Are you talking about  
4 elasticity curves?

5 CHAIRMAN SELIN: Well, I'm talking about  
6 just the shares under the three different price  
7 assumptions. If you have those, could you send those  
8 over at some point?

9 COMMISSIONER REMICK: So your model is  
10 predicting in the residential area no net increase.  
11 In other words, the efficiency will about equal the  
12 growth and population, is that it?

13 MR. BEAMON: It's very close. Residential  
14 only grows, what, about .7 percent a year?

15 MS. HUTZLER: Yes. There's only about a  
16 quad increase.

17 DOCTOR HAKES: Okay. At this point, Mr.  
18 Chairman, I'd like to turn it over to Mary Hutzler.

19 MS. HUTZLER: (Slide) Next chart, please.  
20 The chart before, Dave. Okay. There we are.

21 We've already talked about our lower  
22 growth rate for electricity demand. However, even  
23 with that growth rate there is increases in  
24 electrification and we also have retirements of  
25 capacity. So, the utilities do need to meet an

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1 increasing demand for electricity. There are a number  
2 of ways to do this. First, we can increase the  
3 utilization of existing plants. We can extend the  
4 lives of existing plants. We can import electricity  
5 from other countries. We can purchase power from non-  
6 utility generators and we can introduce demand side  
7 management programs. After all of that, of course we  
8 construct power plants and I'll talk to you about each  
9 of these in turn.

10 First of all, on the utilization of  
11 electric power plants, we all know that the utility  
12 industry over built in the 1970s and '80s because they  
13 perceived a higher growth rate for demand and in  
14 actuality it only achieved about half that amount.  
15 So, back in 1970, coal power plants, their utilization  
16 rate was around 69 percent. That came down to 53  
17 percent in 1978 because of the over building and we  
18 have it going back up in the forecast and maintaining  
19 a rate of 68 percent by 2010.

20 In terms of the nuclear industry, the  
21 utilization rate has increased as the industry has  
22 developed and in late 1980s we're at a 57 percent  
23 capacity factor. Recently the power plant performance  
24 of nuclear plants has really achieved a high and we're  
25 at 72 percent in 1993 and we have it going to 74

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1 percent in 2010.

2 CHAIRMAN SELIN: That's just an input. I  
3 mean -- or is there --

4 MS. HUTZLER: The max is an input. So,  
5 the 74 percent is an input, but where it achieves it  
6 is model determined.

7 In terms of combined cycle plants, you can  
8 see that in the mid-'80s we actually started that  
9 industry and the capacity factor, of course, was low.  
10 It got pretty high with a few plants that came on  
11 board. It's coming down currently because we have new  
12 plants entering in. So, the average comes down. But  
13 we have it reaching the nuclear power plant capacity  
14 factor in the 2000 range, exceeding 70 percent.  
15 You'll see --

16 CHAIRMAN SELIN: Would that be very price  
17 sensitive?

18 MS. HUTZLER: It is price sensitive and  
19 that's why it comes down in the year 2005. In that  
20 time period, we have coal power plants coming back.  
21 We have them being built because the gas price gets  
22 pretty high. In fact, whenever -- gas will hit price  
23 doubling from 1990 to 2010, which is \$3.47.

24 CHAIRMAN SELIN: You have coal plants  
25 coming on or starting construction?

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1 MS. HUTZLER: Being built and coming on,  
2 both, and you'll see that in a later graph.

3 CHAIRMAN SELIN: Okay.

4 COMMISSIONER ROGERS: Well, just on that,  
5 again there is this dramatic drop starting in 2005 of  
6 the combined cycle. I noticed in your Outlook '94  
7 Report that there was a dramatic takeoff in wind  
8 energy in 2005.

9 MS. HUTZLER: Yes.

10 COMMISSIONER ROGERS: I have a question on  
11 what the basis of that is at sometime. But there  
12 seems to be an awful lot happening at 2005 in these  
13 models.

14 MS. HUTZLER: That's because of the gas  
15 price and the oil price getting up there at that point  
16 in time. In this modeling system we introduced a new  
17 methodology that allows wind to compete as a fuel  
18 saver. So, if building new power plants is cheaper  
19 than running existing power plants, which it does when  
20 the price gets high enough for oil and natural gas, we  
21 do allow wind to be built and that's what's happening  
22 in the post-2005 period for wind. And you'll see a  
23 chart later that shows the difference between the low  
24 oil price case and the high oil price case, what that  
25 phenomena does.

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1 CHAIRMAN SELIN: You're very sensitive.  
2 A couple cents increase in coal and all of a sudden  
3 you get a major -- I mean gas or oil, you get a major  
4 shift to coal and wind.

5 MS. HUTZLER: The model is very sensitive  
6 to future prices of fossil fuels. We do a lifecycle  
7 costing methodology to determine what capacity should  
8 be built and we assume future prices will be an  
9 adaptive methodology of past history. If you change  
10 that, if you assume perfect foresight in that, it does  
11 change what your build pattern will be.

12 CHAIRMAN SELIN: You're in effect assuming  
13 that when people make construction decisions they know  
14 what the price of fuel will be when the stuff comes  
15 on-line.

16 MS. HUTZLER: Well, the model uses a  
17 number for it. We can assume different assumptions.  
18 But planners assume different numbers as well.

19 CHAIRMAN SELIN: This is really sort of  
20 haggling. I'm sorry about that. When you decide to  
21 build a plant, you're looking at a range of prices.  
22 The actual decision is made saying gas will be  
23 someplace between \$2.25 and \$2.75 a thousand cubic  
24 feet. People don't know what the price will be when  
25 the plant comes on. They only know what the price is

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1 when they make the decision. That's too subtle for  
2 the model to catch?

3 MS. HUTZLER: Well, the model needs a  
4 point estimate essentially. But that's why we do a  
5 range. We do different world oil price scenarios and  
6 different macro scenarios.

7 CHAIRMAN SELIN: But in each of the  
8 scenarios you assume the planners know what the price  
9 will be when --

10 MS. HUTZLER: Yes.

11 MR. SITZER: Well, we assume that they  
12 will trend out from recent trends.

13 CHAIRMAN SELIN: What does that mean?

14 MR. SITZER: That over the most recent  
15 four or five or six year period, that those trends  
16 will continue into the future and that that's what the  
17 planners believe will happen.

18 MS. HUTZLER: Yes, but you can do that at  
19 different rates, of course.

20 (Slide) Next chart.

21 This one is on our life extension  
22 assumptions. What you see here is our life extension  
23 assumptions for coal and oil and gas. Essentially  
24 we're assuming 343 gigawatts of capacity will be life  
25 extended by the utility industry. The reason for that

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1 is that utilities report to us what their future plans  
2 are and they have only reported to us that they're  
3 going to retire 14 gigawatts of capacity, which is not  
4 very much. We also assume that an additional 36  
5 gigawatts of fossil fuel capacity will be retired.  
6 These are the smaller units. They're less than 100  
7 megawatts.

8 CHAIRMAN SELIN: Non-utility or some  
9 utility and some not utility?

10 MS. HUTZLER: These are all utility.

11 CHAIRMAN SELIN: All utility? And on  
12 nuclear do you assume no life extension?

13 MS. HUTZLER: We assume no life extension.

14 CHAIRMAN SELIN: Forty years.

15 MS. HUTZLER: And then it's 40 years,  
16 right?

17 MR. BEAMON: Correct.

18 MS. HUTZLER: Forty years.

19 CHAIRMAN SELIN: I don't know what the  
20 right number is, but I'm absolutely certain that  
21 almost no power plant will run just 40 years. If  
22 there's a life extension program, they'll go on.  
23 Otherwise they'll come off well before their 40 years  
24 are up in many cases.

25 COMMISSIONER REMICK: What is your basis

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1 for assuming no life extension, the fact that the  
2 utility has not reported they intend to or is that  
3 some kind of an assumption by the group?

4 MS. HUTZLER: For nuclear plants?

5 Jim, do you want to discuss that?

6 MR. HEWITT: As you are very well aware,  
7 no utility has taken advantage of your license renewal  
8 program. In fact, the two pilot plants have both  
9 dropped out. So, it basically just froze the  
10 retirement date at the end of their current operating  
11 license.

12 CHAIRMAN SELIN: We have a new offer to be  
13 put on the table. Maybe you'll pick it up next time.

14 MS. HUTZLER: Okay. Do you think they'll  
15 take advantage of it?

16 CHAIRMAN SELIN: Yes. I mean I believe  
17 there will be a significant number of utilities, which  
18 is someplace between a quarter and three-quarters,  
19 that will take advantage. Or at least they'll run to  
20 their 40 years, which they probably wouldn't do  
21 otherwise and then a lot of them will take advantage  
22 of going forward.

23 MS. HUTZLER: But we are allowing them to  
24 run to their 40 years.

25 CHAIRMAN SELIN: Yes, but without life

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1 extension most of them won't even run to the 40 years.  
2 You face a large capital increase at the end of 32 or  
3 33 years and if there's no stock option to extend --  
4 I mean we see that already in more politically charged  
5 places, but we see that already.

6 COMMISSIONER REMICK: I would say assuming  
7 no extension is a very arbitrary decision that is very  
8 questionable in my mind. You're making assumptions on  
9 the others without indications from industry, I  
10 assume, of extension and I think that's a very  
11 arbitrary decision.

12 MS. HUTZLER: What do you think it would  
13 be in terms of percent of the plants in life  
14 extension?

15 COMMISSIONER REMICK: I don't know what  
16 percent, but I feel very, very strongly it's greater  
17 than zero percent.

18 MS. HUTZLER: But it may in fact balance  
19 out for the ones that don't go to 40.

20 COMMISSIONER REMICK: That's possible.

21 MS. HUTZLER: Yes. Yes, because certain  
22 plants are going to come off-life earlier, as the  
23 Chairman indicated, and some are going to go further,  
24 but will it balance out on average? I mean it's hard  
25 to predict what every plant in the country would do.

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1 CHAIRMAN SELIN: I think a fair statement  
2 is when you do this next year you'll have a lot more  
3 information because we don't have a practical rule on  
4 the books now. We probably will by next year and then  
5 it's not just whether you can get an extension. The  
6 perceived cost of getting an extension -- the  
7 perceived cost to the utilities of getting an  
8 extension has gone down dramatically from two years  
9 ago. Once there's a concrete rule on the books, when  
10 you talk to them next year I think you'll get real  
11 answers whereas now they're answering a hypothetical  
12 question.

13 MS. HUTZLER: Yes. Of course it's  
14 difficult for utilities right now. It's hard to get  
15 any answers from them on any of these subjects because  
16 the whole industry is in such turmoil, especially with  
17 the deregulation issues. So, it's very hard to  
18 foresee the future.

19 COMMISSIONER de PLANQUE: But for the  
20 other fuel sources, are you saying you are getting  
21 real data on which you're basing these numbers from  
22 the utilities?

23 MS. HUTZLER: No. What we're saying is  
24 we're getting data in terms of their retirements and  
25 they're not retiring and we've seen them keep their

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1 plants on-line, and they have done extensive  
2 maintenance. Based on seeing that kind of thing, we  
3 are assuming that that's happening.

4 COMMISSIONER de PLANQUE: Okay.

5 MS. HUTZLER: And we do --

6 CHAIRMAN SELIN: If that were the rule,  
7 you would then over estimate the nuclear extensions  
8 because the nuclear plants are essentially run as if  
9 they're going to run forever. I mean people have to  
10 make greater investments in maintenance, greater  
11 capital replacement, et cetera, unless they've already  
12 decided to close down early. For instance, their  
13 power plants, which I wouldn't name, that have changed  
14 steam generators which I think are unlikely to even  
15 run the 40 years because of economic or waste  
16 decisions. So, if you just looked at their behavior  
17 as opposed to what they say, you would come out over  
18 estimating the lifetime of the plants rather than on  
19 the rest of it.

20 MS. HUTZLER: Well, at the time we were  
21 doing these forecasts there was a lot of discussion in  
22 the press about the nuclear units and the Trojan issue  
23 and that plant not being continued. So, there was a  
24 lot of controversy as to are these plants going to  
25 continue. But we would certainly like to get your new

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1 information. We'll certainly use that for our next  
2 set of forecasts.

3 CHAIRMAN SELIN: We keep changing the  
4 rules. So, it's a little hard for them to predict  
5 what's going on. But I think it will be pretty stable  
6 by the time you do your next survey.

7 MS. HUTZLER: And we do include the cost  
8 of life extension and they range from over \$100.00 a  
9 kilowatt to \$218.00 a kilowatt for coal.

10 CHAIRMAN SELIN: That's pretty cheap.

11 MS. HUTZLER: Yes, it is. So, that's one  
12 reason why these fossil plants get to --

13 CHAIRMAN SELIN: You assume clean air just  
14 sort of freezes at Clean Air Act 2 and no further  
15 tightening up of clean air regulations?

16 MS. HUTZLER: That's right. They have to  
17 maintain that 8.9.

18 CHAIRMAN SELIN: That's actually the  
19 biggest uncertainty in capital cost in existing coal  
20 plants is to know what the government is going to  
21 require of them rather than just how to keep them  
22 running.

23 MS. HUTZLER: There are a lot of  
24 uncertainties.

25 MR. BEAMON: What they did with carbon.

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1 MS. HUTZLER: Yes, carbon is the biggest  
2 one. And we didn't do anything, as Mr. Hakes said,  
3 about carbon in this year's forecast. We do not have  
4 the stabilization plan in here.

5 CHAIRMAN SELIN: Is there technology  
6 available that would get them a higher thermal  
7 efficiency than they now have?

8 MR. BEAMON: They can certainly get more  
9 efficient. There is carbon reduction technology, but  
10 it takes about 30 or 40 percent of the energy of the  
11 plant. So, it would hardly make them economic, but  
12 scrubbers were pretty expensive when they were first  
13 introduced too. So, I don't know.

14 MS. HUTZLER: (Slide) Okay. Moving onto  
15 the next chart.

16 This shows our retirements. Essentially  
17 we have --

18 CHAIRMAN SELIN: The nuclear just as they  
19 come to the end of their 40 year term, I assume?

20 MS. HUTZLER: Yes, exactly. And of the  
21 15.7 gigawatts nuclear, there are four units that have  
22 already retired since we started this at 1990 that  
23 include Rancho Seco, Yankee Rowe, San Onofre and  
24 Trojan. The remaining units are -- there are 13.1  
25 gigawatts that we have in the forecast. Coal and gas

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1 come out about equal in terms of their retirements.  
2 The other category is hydro and turbines.

3 (Slide) Dave, the next chart, please?

4 This chart takes a look at our trades with  
5 Canada and Mexico. If you take a look at history, we  
6 reached a peak in terms of net imports of 46 billion  
7 kilowatt hours in 1987. The top line shows gross  
8 imports from Canada and Mexico. The bottom line is  
9 our gross exports. So, the middle line is what our  
10 net imports are.

11 In 1990 you will see --

12 CHAIRMAN SELIN: I don't understand. What  
13 happened in 1990?

14 MS. HUTZLER: 1990 was a drought in Canada  
15 that affected their hydro. They also had coal units  
16 down to be retrofitted with scrubbers and they also  
17 had some problems with nuclear plants. So, they  
18 couldn't give us the power they were giving us in the  
19 past and we only got two billion kilowatt hours in  
20 terms of net imports in that year.

21 CHAIRMAN SELIN: Is there a Canadian EIA?

22 MR. BEAMON: Yes, there's a Canadian  
23 statistical --

24 CHAIRMAN SELIN: What do they do for  
25 forecasts because I think there's going to be gross

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1 closing down of uneconomic power plants in Canada. I  
2 really think availability of cheap electricity for  
3 export to the United States is going to change.

4 MR. BEAMON: You just explained our  
5 reduction in our forecast.

6 MS. HUTZLER: Our forecast, yes.

7 CHAIRMAN SELIN: Is that based on -- I  
8 mean Hydro Canada operates a whole bunch of plants.  
9 You can only generate electricity at six cents and  
10 sell it at three cents for so long. I just don't  
11 believe they're going to continue to operate that way.

12 MS. HUTZLER: Right. And that's what --  
13 we keep file of contracts and that's what we're seeing  
14 in the future, that there will be termination of  
15 contracts and that's why -- in fact, we're going to be  
16 supplying more power. So, you see these gross exports  
17 going up in the late 1990s and you're actually seeing  
18 our net imports coming down because of those contracts  
19 not being renewed.

20 CHAIRMAN SELIN: Is this almost all Canada  
21 or is this --

22 MS. HUTZLER: Yes, 99 percent Canada.

23 CHAIRMAN SELIN: Are people talking about  
24 building plants in Mexico and exporting to the United  
25 States or anything like that?

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1 MR. BEAMON: Discussion right on the part  
2 of the grid that's synchronized, right on the border,  
3 but not too much on non-utilities, I think.

4 MS. HUTZLER: And it wouldn't be a good  
5 deal. It's just a small amount.

6 (Slide) Okay. Next chart, Dave.

7 We're moving on to the non-utilities share  
8 of total generation now. Back in the '60s, I guess,  
9 the --

10 CHAIRMAN SELIN: Non-utilities include  
11 IPPs or just industrial generators?

12 MS. HUTZLER: Actually, this particular  
13 chart includes everything, co-generators, IPPs and  
14 what we call exempted wholesale generators that came  
15 about with EAct and the revisions to PUHCA.

16 CHAIRMAN SELIN: What's an example of an  
17 exempt generator?

18 MS. HUTZLER: Alan, do you want to discuss  
19 it?

20 MR. BEAMON: Discuss what it is?

21 CHAIRMAN SELIN: Just give me an example.  
22 I don't know what that is.

23 MR. BEAMON: Well, in the recent EAct,  
24 they revised the PUHCA legislation so that basically  
25 anybody who can become an independent generator and if

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1 they can meet certain criteria they don't have -- they  
2 had a big issue on market power and whether they own  
3 transmission lines in the area and all of that. They  
4 came become what they classify as an exempt wholesale  
5 generator and not have to file with the SEC as a  
6 utility and they're relieved of those requirements.

7 CHAIRMAN SELIN: It's another kind of IPP?

8 MS. HUTZLER: Yes, exactly.

9 MR. BEAMON: It's another kind of IPP,  
10 right.

11 CHAIRMAN SELIN: And if you have a utility  
12 selling electricity out of his region, does that show  
13 as a non-utility in your projections?

14 MR. BEAMON: Right.

15 MS. HUTZLER: Yes.

16 CHAIRMAN SELIN: So, it's -- okay.

17 MS. HUTZLER: Okay. Essentially we had  
18 about seven percent of the share of total generation  
19 in 1970 being non-utilities. That was mainly co-  
20 generators back in that time in industrials. When  
21 electricity prices from utilities became cheap, the  
22 industrials bought from utilities, so that share  
23 declined at three percent in 1980. But we had PURPA  
24 in 1978 which brought about the requirement that  
25 utilities had to purchase power from qualifying

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1 facilities and after that got out of the courts we  
2 found many sales going to utilities. So, by 1990, we  
3 exceeded the historical share of seven percent. Also  
4 by 1990 we had the amount of sales to utilities  
5 equaling the amount of generation for own use that  
6 these industrial co-generators had. In our  
7 projections we have it growing to ten and a half  
8 percent by 2000 and almost 15 percent in 2010.

9 CHAIRMAN SELIN: Could you talk a little  
10 bit about you make these projections and, in  
11 particular, now sensitive are they to electricity  
12 pricing?

13 MR. BEAMON: Well, with respect to the  
14 exempt wholesale generators, we compete them just as  
15 with utilities. We have a price structure, a capital  
16 structure, assumed capital structure in there for the  
17 non-utilities and we compete them straight over with  
18 a utility power plant. They'll be selected if they're  
19 less expensive.

20 Are you talking about the avoided price of  
21 electricity?

22 CHAIRMAN SELIN: Yes.

23 MR. BEAMON: We make an assumption about  
24 what the purchase price will be to the co-generators  
25 and that's passed to our industrial model and they

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1 choose whether to generate themselves or whether to  
2 add co-generation to that.

3 CHAIRMAN SELIN: What's behind my question  
4 is that up until now if you want to be a non-utility  
5 generator, you had to build something. In other  
6 words, you had to make a major capital investment.  
7 But as wheeling becomes easier, and given your answer  
8 that a utility that's wheeling to another district is  
9 a non-utility generator, it becomes more of a pricing  
10 and marketing decision in the long-term. So, I would  
11 expect that the growth in non-utility U.S. generation  
12 could be even greater than this if --

13 MR. BEAMON: If you're including  
14 interregional trade, we didn't include that.

15 CHAIRMAN SELIN: That's what I meant to  
16 ask you.

17 MR. BEAMON: I think I misspoke on that.  
18 We don't include them as non-utilities now. That's  
19 just interregional trade --

20 CHAIRMAN SELIN: Okay.

21 MR. BEAMON: -- amongst utilities.

22 MS. HUTZLER: (Slide) Okay. Dave, next  
23 chart.

24 The next two charts we're going to look at  
25 the DSM, demand side management energy savings. This

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1 first chart shows the growth between 1990 and 1997.  
2 These are the numbers that utilities report to us as  
3 their plans on their forms. We go from 19 billion  
4 kilowatt hours to 73. In terms of percent of demand,  
5 it's .7 in 1990 and 2.4 in 1997.

6 COMMISSIONER REMICK: How do they separate  
7 out savings from demand side management from  
8 recession, efficiency, conversion from high energy  
9 intensive uses? How do they separate that out? Are  
10 these just projections of what they think they've  
11 saved by these efforts?

12 MR. BEAMON: These are purely their  
13 projections.

14 COMMISSIONER REMICK: Yes. Okay.

15 CHAIRMAN SELIN: So there's no model here?  
16 In other words, if competition leads to an even lower  
17 rate of growth in electricity prices and therefore DSM  
18 becomes relatively more expensive, we don't have a way  
19 to fit that.

20 MR. BEAMON: It becomes less economic.  
21 So, yes, they wouldn't do it.

22 COMMISSIONER REMICK: What incentive is it  
23 to report large numbers? How much do you believe  
24 these numbers?

25 MS. HUTZLER: I think we think they're

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1 reasonable and the way we test that is we take a look  
2 at what our model produces in terms of savings but  
3 total savings that include conservation and efficiency  
4 and we take a look at what percent these numbers  
5 represent. It is less than half of that. I don't  
6 remember the exactly numbers, but it's in a range that  
7 we think these could be plausible. It is embedded in  
8 our efficiency in terms of the way we represented it  
9 today.

10 MR. BEAMON: We can't answer how much of  
11 what they're reporting might be free ride.

12 COMMISSIONER REMICK: Yes.

13 MS. HUTZLER: Yes.

14 MR. BEAMON: It might have happened  
15 anyway. So, we're not sure about that.

16 MS. HUTZLER: Yes. That's where the  
17 statistics really become complicated.

18 CHAIRMAN SELIN: But you do have -- I mean  
19 peeking ahead, which I know is immoral, your kilowatt  
20 hour per dollar of DSM is much better in '97 than '93.

21 MS. HUTZLER: (Slide) Yes. Why don't we  
22 move on to the next chart then.

23 CHAIRMAN SELIN: Is there reason to  
24 believe that that's true?

25 MS. HUTZLER: Well, this is what the

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1 utilities are anticipating that they're going to spend  
2 in terms of getting the savings that you saw in the  
3 previous chart. So, they're talking about that kind  
4 of planning in terms of their own expenditures. It's  
5 an 18 percent annual growth rate, so it is pretty  
6 steep.

7 CHAIRMAN SELIN: Yes. But look, they're  
8 getting 15 kilowatt hours per dollar of expenditure in  
9 '93 and they're getting 20 kilowatt hours per dollar  
10 of expenditure in '97. That goes against everything  
11 that I understand.

12 MR. BEAMON: Well, you've got to realize  
13 that in the early years all the DSM expenditures were  
14 on -- they were on load saving programs, not on energy  
15 saving programs. So, you wouldn't have expected to  
16 see too much energy savings for them. And then the  
17 reverse is you seem to see almost a 50/50 or even more  
18 toward the energy savings programs now that they're  
19 actually out there pushing air conditions, pushing  
20 refrigerators instead of pushing peak load programs  
21 and interruptible load programs and all these programs  
22 that shaved their peak load but didn't shave energy.

23 CHAIRMAN SELIN: I see. So, the right  
24 measure from the utility's point of view is cost of  
25 generation, not --

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1 MR. BEAMON: Well, it's both because now  
2 they're having programs that affect both peak and  
3 energy.

4 CHAIRMAN SELIN: So you don't think -- I  
5 mean basically what's to be saved in load leveling has  
6 been saved by '93 and the additional expenditures are  
7 going into energy savings?

8 MR. BEAMON: Well, they're still going to  
9 save load leveling by putting it in an air  
10 conditioner, but they're also going to save energy.  
11 So, it has an impact on both.

12 CHAIRMAN SELIN: So, basically you've  
13 confused me at this point. I thought it was pretty  
14 clear that that was wrong, but utilities have been  
15 complaining to us that they've gotten about what they  
16 can get fairly easily and that what they see they have  
17 to spend for demand side management just isn't going  
18 to be economical from here on in.

19 MR. BEAMON: Well, if you think of the  
20 history, just residential programs, if you look at it  
21 years ago, the major programs they were pushing to  
22 consumers were things like cycling programs where  
23 they'd come put a box on your air conditioner. So,  
24 they cycled that thing off during peak demand. That  
25 shaved the peak but it didn't affect their energy.

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1 You'd have a rebound effect outside of the peak and  
2 that would come back. Now they're going and pushing  
3 whole new air conditions to the guy and it cuts his  
4 energy across all of his uses, not just the peak. So,  
5 you have a different impact.

6 MS. HUTZLER: (Slide) Okay. Can I have  
7 the next chart, Dave?

8 COMMISSIONER REMICK: Am I correct that  
9 the DSM expenditures are also increased cost to the  
10 customer?

11 MR. BEAMON: Absolutely.

12 CHAIRMAN SELIN: Well, at least their  
13 increase per kilowatt hour. That way they'd be not  
14 increased per day of refrigeration or something like  
15 that.

16 MS. HUTZLER: Okay. Moving on to the  
17 amount of additional capacity we feel is needed to  
18 meet the demand and also to replace the retirements  
19 that we have. We see 172 gigawatts of new capacity  
20 being needed. Some of this is already planned by  
21 utilities at 67 gigawatts, but we feel that utilities  
22 and non-utilities need to build an additional 105  
23 gigawatts to meet the demand and also the retirements.

24 If you take a look at the chart, you'll  
25 see that in the early years we're building turbines

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1 and combined cycle units. There are 42 gigawatts of  
2 turbines and 50 of combined cycle units. The reason  
3 for that is that they have shorter lead times and the  
4 economics show that they are favorable to them in the  
5 shorter time frame, particularly with the inexpensive  
6 gas prices.

7 In the post 2005 period, we do have coal  
8 coming back because of the higher gas prices at that  
9 point and we have 43 gigawatts of coal. Also, we're  
10 losing most of our nuclear plants that are being  
11 retired in the post 2000 period. So, coal is  
12 replacing some of those.

13 Renewables, we have 27 gigawatts coming  
14 on-line and again post 2005 we have more renewables in  
15 a lot of wind because of the fuel saver issue. The  
16 nuclear we have six gigawatts of capacity that we see  
17 that's all planned. One unit is Comanche Peak that's  
18 already come on-line and the other four units we see  
19 are the TVA units, Watts Bar 1 and 2 and Bellefonte 1  
20 and 2.

21 CHAIRMAN SELIN: So, those are inputs to  
22 the model. I mean you've looked at the real world and  
23 just said --

24 MS. HUTZLER: That's right.

25 CHAIRMAN SELIN: So, since our judgment is

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1 not necessarily worse than yours in nuclear, we can  
2 set that aside and talk about the others.

3 MS. HUTZLER: Okay.

4 CHAIRMAN SELIN: The renewables are also  
5 projected? Up until 2005 they're assumed and then  
6 they come out of the model?

7 MS. HUTZLER: No. What happens here is  
8 that any units that the utilities report to us as  
9 planned units are embedded in the forecast. They  
10 report that information directly to EIA and it's  
11 totally enhanced by the utility. Then our model  
12 determines what other units we need to build to meet  
13 demand. We have unplanned units coming on in probably  
14 1997 already because we'll need more demand than the  
15 utilities say. For instance, they might not report a  
16 turbine plant to us because they can get it up in a  
17 year or two.

18 CHAIRMAN SELIN: I'm just talking about  
19 renewables.

20 MS. HUTZLER: Oh, just renewables?

21 CHAIRMAN SELIN: Because the renewables  
22 are so complex. You need land and --

23 MS. HUTZLER: Yes. Okay. Most of those  
24 are planned units up to certainly the late 1990s. But  
25 post 2000 we're building additional --

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1 CHAIRMAN SELIN: And then you're just  
2 assuming that if the price is attractive they can find  
3 the land and handle any of our mental issues  
4 thereafter when you're passed the planned units.

5 MR. BEAMON: There are supply curves in  
6 the model of resources when availability. They've  
7 made -- Scott could probably talk more about it than  
8 I can, but they have made decisions on where they are  
9 most advantageous and how much is available in each  
10 one of the regions of the country.

11 CHAIRMAN SELIN: Okay. So you don't just  
12 assume infinite availability --

13 MR. BEAMON: No.

14 MS. HUTZLER: No.

15 MR. BEAMON: We represent various  
16 different wind classes and represent how much of it  
17 would be available in each region and at what cost.

18 MR. SITZER: We have different resource  
19 levels for wind, solar and geothermal in the model  
20 that we're trying to represent.

21 COMMISSIONER REMICK: Could you explain  
22 the difference between turbine and combined cycle?  
23 You mean just straight gas turbine as your turbine?  
24 Is that it?

25 MR. BEAMON: Right.

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1 MS. HUTZLER: Yes.

2 CHAIRMAN SELIN: And the coal, if I  
3 understood the discussion up until now correctly,  
4 which I'm not sure I did, this big steep increase in  
5 coal assumes that at the year 2000 when people had to  
6 make the decision to build this, they had a point  
7 estimate for coal that gas would get much more  
8 expensive on January 14th, 20005.

9 MS. HUTZLER: Yes.

10 CHAIRMAN SELIN: Because I think in the  
11 real world you wouldn't see such a steep increase.  
12 The real benefit of gas from an investors point of  
13 view is if the lifetime costs are comparable to coal,  
14 the front end costs are much lower and therefore they  
15 can hedge their investment better. I wouldn't think  
16 you'd see such a steep increase in coal construction  
17 if you used perceived prices as opposed to point  
18 estimates of prices.

19 MS. HUTZLER: Well, you do see the  
20 combined cycles coming in pretty steep.

21 CHAIRMAN SELIN: I am surprised that even  
22 with the high prices of coal you have so much -- I  
23 mean of gas, you have so much new gas capacity coming  
24 on after 2005.

25 MS. HUTZLER: But the chart looks it, Alan.

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1 MR. BEAMON: No, I mean it's not that much  
2 more. That's a cumulative number. So, it continues  
3 that way. But gas efficiencies are fairly high too  
4 for combined cycle units, even with some increasing --

5 CHAIRMAN SELIN: Well, but you have as  
6 much turbine as combined cycle until 2003 or so.

7 MR. BEAMON: Well, right now, in the  
8 short-run, many of your utilities are heavily over  
9 base-loaded. So, even with less attractive gas prices  
10 they would be building turbines.

11 MS. HUTZLER: (Slide) All right. Next  
12 chart.

13 This chart shows the difference between  
14 the amount of capacity needed between our low, mid and  
15 high macroeconomic growth cases. If you recall, we  
16 had a difference of .5 percentage points between the  
17 growth rate in the low case for electricity of one  
18 percent and the high case 1.5 percent. And the  
19 difference amounts to 69 gigawatts of capacity.

20 CHAIRMAN SELIN: But your retirement rate  
21 is assumed to be independent of the growth rate for  
22 electricity.

23 MS. HUTZLER: Yes.

24 CHAIRMAN SELIN: That's probably not  
25 right. I mean think about how people make decisions.

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1 Unless they knew 20 years in advance what the growth  
2 rate would be, they would phase down faster if they  
3 saw lower growth rates and keep things longer if they  
4 saw --

5 MS. HUTZLER: Well, part of it is  
6 economics too though. I mean if it's cheaper to keep  
7 that plant on, why build a new one?

8 CHAIRMAN SELIN: Because -- I mean the  
9 main thing is you don't know if it's cheaper or not.  
10 It depends on things you can't tell. So, you keep  
11 them around for another year or two.

12 MS. HUTZLER: Yes, that's true.

13 CHAIRMAN SELIN: What I'm saying is I  
14 think in the real world the difference in cumulative  
15 capacity between the high and the low cases wouldn't  
16 be this great, but people would hedge by making  
17 different decisions on extending their existing  
18 plants.

19 MS. HUTZLER: Okay. One point to note in  
20 this particular chart is that the fossil steam and the  
21 greater the amount of capacity you need the more  
22 fossil steam you have and that's the biggest  
23 difference between those different bars.

24 (Slide) Okay. Next chart, Dave.

25 This chart shows generation by fuel type.

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1 Coal is where we get most of our generation from. In  
2 terms of shares in 1990, it's 55 percent and it  
3 maintains that at 54 percent in 2010.

4 We have a slightly different story here  
5 between nuclear and gas than we did last time we  
6 briefed you. Last time we told you gas was going to  
7 become the number two in terms of generation. This  
8 year we still have nuclear as number two. Its share  
9 declines from 20 percent to 17 percent. The reason  
10 why we do get increasing amount of generation even  
11 with the retirements I mentioned is the capacity  
12 factor improvement.

13 CHAIRMAN SELIN: Just for your own  
14 information, I personally believe that capacity  
15 factors will, in fact, be even higher than you have  
16 them there by the year 2010 because the plants --  
17 well, first of all, I think life will be extended.  
18 Secondly, obviously the plants with the better  
19 capacity are more likely to extend their life. So,  
20 there will be a kind of a selection out and you'll end  
21 up with 76, 77 percent capacity factor by the end of  
22 this period. So, between the two, some plant life  
23 extension and some higher factors, I think the actual  
24 generation will be somewhat greater than projecting.  
25 This is not assuming new plants at all.

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1 MS. HUTZLER: Okay. All right. We do  
2 have gas, of course, going up from a ten percent share  
3 to a 14 percent share, oil going down and there's a  
4 slight increase in renewables in terms of a share from  
5 11 to 13 percent. The next --

6 CHAIRMAN SELIN: That includes hydro?

7 MS. HUTZLER: Yes, that includes hydro.

8 CHAIRMAN SELIN: So, the actual increase  
9 in renewable is very small. All this wind is  
10 relatively small compared to the baseload. What are  
11 you assuming about hydro in the Northwest, for  
12 instance? You're not assuming a lot of shutdowns?

13 MS. HUTZLER: No. No. We're mostly  
14 assuming that what's there will remain there.

15 CHAIRMAN SELIN: I see.

16 MS. HUTZLER: Very little change.

17 CHAIRMAN SELIN: I don't think that's  
18 right. I think the environmental pressure against  
19 dams is going to get much, much stronger by that time  
20 period.

21 MR. BEAMON: I think it would mostly be  
22 some of these very small dams. You might not see much  
23 change in capacity.

24 CHAIRMAN SELIN: Is that right?

25 MR. BEAMON: I'm not sure.

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1 MS. HUTZLER: Did you think that in the  
2 Northwest they would actually be closing down some?

3 COMMISSIONER REMICK: Or reducing capacity  
4 because of environmental -- fish life concerns and so  
5 forth. Well, they're already doing it.

6 CHAIRMAN SELIN: Grossly speaking, I think  
7 TVA will continue where it is and the Bonneville Power  
8 Authority will reduce significantly. But they know  
9 better than we do.

10 MR. SITZER: We're fairly conservative  
11 about our assumptions on hydro until we know more  
12 about the relicensing process which is going to be  
13 kicking up in the next couple years.

14 MS. HUTZLER: (Slide) Okay. Next chart,  
15 please.

16 This one shows the breakdown of the  
17 renewables by type and essentially over two different  
18 cases, our world oil price case. This is the chart I  
19 mentioned to you before where I wanted to explain to  
20 you what was happening with wind because we had the  
21 four fold increase between our low world oil price  
22 case that only gets to \$20.00 in 2010 versus our high  
23 price case that gets to \$34.00 per barrel of oil in  
24 2010. That increase is due to the use of wind as a  
25 fuel saver because it's cheaper to build it than to

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1 use existing oil and gas.

2 CHAIRMAN SELIN: What's biomass?

3 MS. HUTZLER: Biomass is mostly in our  
4 NUGS category and mostly in our industrial category.

5 MR. SITZER: It's wood.

6 MS. HUTZLER: Yes, wood.

7 CHAIRMAN SELIN: My own feeling, and I  
8 have no basis for this whatsoever, is I think by the  
9 year 2010 you're going to get a significant  
10 environmental -- what's the right word -- complaint  
11 about air, about wind, a backlash.

12 COMMISSIONER REMICK: With the growth in  
13 developing countries of burning of coal and so forth  
14 and worldwide impact on that, I think there's going to  
15 be pressure on countries like the United States that  
16 have the ability and the alternate technologies and so  
17 forth. There's going to be pressure on us to do more  
18 to cut down the world's emission of carbon and so  
19 forth and where the developing countries either can't  
20 or won't.

21 CHAIRMAN SELIN: I just don't think North  
22 Dakota is going to want to cover itself with windmills  
23 after awhile.

24 MS. HUTZLER: Well, actually, we don't  
25 have North Dakota covering itself with windmills, and

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1 that turns out to be a terrible --

2 CHAIRMAN SELIN: Where are they?

3 MS. HUTZLER: Most of these windmills are  
4 California, the Northeast and the South.

5 CHAIRMAN SELIN: Really?

6 MS. HUTZLER: Yes. And it turns out they  
7 believe a lot of wind capacity in the north, but we  
8 don't have a lot of demand in the north and we have  
9 lots of coal plants there. So, we don't need it based  
10 on demand.

11 CHAIRMAN SELIN: I thought California  
12 without subsidies wasn't really economical. Is that  
13 not true?

14 MS. HUTZLER: Well, you have to realize we  
15 only have about 10 gigawatts of wind and if you spread  
16 out a little bit here and there. But you're right,  
17 California is not bringing in a lot of wind, but I  
18 think we have a little bit coming from California.

19 MR. BEAMON: We actually have -- it's only  
20 about ten gigawatts. It looks like a big number  
21 because it was starting from a small number, but this  
22 is not all that big.

23 MS. HUTZLER: Right. We do have some  
24 geothermal and that's mainly for baseload power in  
25 California where they're not going to use coal and

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1 they're not building nuclear.

2 (Slide) We can move onto the next graph.

3 CHAIRMAN SELIN: The state capital is  
4 meant to have a high density of wind. Is that the  
5 idea?

6 MS. HUTZLER: We already talked a little  
7 bit before about our electricity price which we have  
8 growing at .3 percent a year. What we tried to do  
9 here is to show you why the price wasn't grown very  
10 much by taking the price and distributing it into the  
11 components, capital, O&M, fuel. We also added  
12 wholesale power. Let me talk about fuel first.

13 We do have increases in our fossil fuel.  
14 So, of course that line should be going up and it  
15 does. O&M, we find on a per kilowatt hour basis that  
16 that's fairly constant. We've seen that in the past  
17 and we see that in the forecast as well. Capital,  
18 what's happening --

19 CHAIRMAN SELIN: That's nominated by what  
20 happens at coal plants.

21 MS. HUTZLER: Probably mostly by coal,  
22 because that's 50 percent of the generation. But, of  
23 course, we do have gas, nuclear.

24 CHAIRMAN SELIN: Coal is relatively high,  
25 O&M relatively low fuel compared to --

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1 MR. BEAMON: But there's T&D equipment  
2 too, transmission and distribution.

3 CHAIRMAN SELIN: Oh, I see.

4 MR. BEAMON: That can be rather  
5 significant in some regions.

6 MS. HUTZLER: Okay. On the capital side,  
7 we have the existing plants being depreciated and then  
8 the new plants coming on-line. However, because we  
9 have the large base of plants, if you divide the new  
10 capital cost of a per kilowatt basis in terms of all  
11 the sales, we actually have the capital component  
12 decreasing because we've depreciated the main bulk of  
13 power plants.

14 CHAIRMAN SELIN: Do you have a handy dandy  
15 factor for cost per kilowatt for new plants of the  
16 coal plants and the turbine?

17 MS. HUTZLER: Did you want per kilowatt?  
18 I think -- isn't coal around \$1300.00?

19 MR. BEAMON: Around \$12, \$1300.00.

20 MS. HUTZLER: Yes, between \$12 and  
21 \$1300.00 per kilowatt.

22 CHAIRMAN SELIN: And what about the gas  
23 price?

24 MR. BEAMON: I would depend on whether  
25 it's a turbine or not. You have \$300.00 or \$400.00

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1 turbines. I think it would be \$5, \$600.00 for  
2 combined cycle, but I'd have to get them exactly.

3 CHAIRMAN SELIN: Those are certainly  
4 reasonable costs.

5 MS. HUTZLER: Okay. Wholesale power is  
6 increasing here mainly because we're purchasing more  
7 and more power from non-utilities. It's not the cost  
8 itself that's going up, but we're just getting more of  
9 it.

10 CHAIRMAN SELIN: Say that again.

11 MS. HUTZLER: Wholesale power. That  
12 represents the increase in non-utility generation.

13 CHAIRMAN SELIN: Oh, it's not per kilowatt  
14 hour of wholesale power, it's per kilowatt of total  
15 electricity.

16 MR. BEAMON: Total, right, and their share  
17 is going up.

18 CHAIRMAN SELIN: So the cost per kilowatt  
19 hour purchased is assumed to be --

20 MR. BEAMON: It's cheaper or they wouldn't  
21 be buying it.

22 MS. HUTZLER: Right, exactly.

23 MS. HUTZLER: (Slide) All right. Moving  
24 on to the next chart.

25 This shows again why the capital component

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1 of price is actually declining and what we've graphed  
2 here on an index basis is sales, which of course are  
3 growing, the rate base where you can see that  
4 depreciation of existing plants is being offset by the  
5 capital additions and it's fairly stable until the  
6 post 2005 period where the capital additions are going  
7 up. But because of the steeper rate of growth and  
8 sales, if you take the rate base and divide it by  
9 sales, you essentially have the capital component of  
10 price going down in the latter years.

11 CHAIRMAN SELIN: I think that that rate  
12 base curve is going to be very different next year  
13 when you start seeing the effect of prospective  
14 competition on what the utilities are doing with their  
15 rate base. Now, all their incentive is to get as much  
16 as they can into the rate base and now we see Florida  
17 Power and Light and a couple of the others starting to  
18 actually mark down their rate base to get their  
19 competitive cost -- the cost more competitive.

20 MS. HUTZLER: So you think it's going to  
21 be lower?

22 CHAIRMAN SELIN: Yes. I think -- I mean,  
23 there won't be any real difference in the spending,  
24 but the accounting will be quite different, that a  
25 whole lot of folks have capital costs in their rate

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1 base because it's a cost-based rate. And since you  
2 can't sell electricity at two prices, one  
3 competitively and the other to the rate base, as their  
4 interest turns more to competitive markets their  
5 incentive to try to push everything they can into the  
6 rate base will change and they're just going to start  
7 writing off their base faster.

8 MS. HUTZLER: Okay.

9 (Slide) All right. Next chart, Dave.

10 We've included this chart just to make  
11 mention that we do have the Clean Air Act amendments  
12 of 1990 incorporated. You can see what happens here  
13 is that between 1990 and 2000 we do have a lot more  
14 low sulphur coal, 148 million tons being consumed. In  
15 the post 2000 period, we do go back to consuming  
16 medium sulphur coal and that's because we're  
17 retrofitting plants with scrubbers and we have new  
18 emission abatement technology. Our high sulphur coal  
19 in all of these has decreased.

20 The allowance cost that we've estimated  
21 within the model is about \$230.00 per ton in 1990, two  
22 dollars in 2000, and it increases to 290 in 2010.

23 Oh, and our retrofits, we have 23  
24 gigawatts of coal capacity being retrofitted.

25 CHAIRMAN SELIN: Just to ask you a

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1 malicious question that's irrelevant to this, did you  
2 do the model with and without -- I mean with different  
3 assumptions on the ability to trade allowances? Does  
4 free trading allowance really reduce total emissions?

5 MS. HUTZLER: We didn't do different  
6 assumptions.

7 MR. BEAMON: We didn't do it without it.  
8 We assumed there was a national cap involved to trade  
9 under.

10 MS. HUTZLER: Okay. We're going to move  
11 next into our regional analysis and I just wanted to  
12 mention again --

13 CHAIRMAN SELIN: Before you do that, I'd  
14 like to come back -- tell me again how you get the  
15 price of natural gas and would it be feasible to  
16 actually run different assumptions on natural gas or  
17 is that once you fix the oil price and the growth the  
18 natural gas price is fixed?

19 MS. HUTZLER: It's probably -- we can  
20 probably change it, but it is endogenously determined  
21 in the model where we represent the cost of drilling  
22 and we have a discounted cash flow model for oil and  
23 gas supply, and after that we take a look at whether  
24 we have enough pipeline capacity to get it to end  
25 users.

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1 CHAIRMAN SELIN: You're assuming that  
2 reserves are not a limit, I mean, that there's plenty  
3 of gas and it's a question of what is it going to  
4 cost --

5 MS. HUTZLER: No, there is a reserve base  
6 that we deal with. We do have technological  
7 improvement that increases that at a two percent per  
8 year rate, but the reserve base is a limiting factor.

9 CHAIRMAN SELIN: I think the gas companies  
10 are getting more sophisticated in their accounting and  
11 they're starting to take into account that reserves  
12 are not infinite and therefore when you sell gas  
13 you're reducing your reserves. Up until now the  
14 accounting has been essentially that the gas is free  
15 and the more you sell the more your income is, but if  
16 you have to really keep track of a reduction in stock  
17 as you sell then you're very sensitive to price and  
18 how much you produce and I don't think the models pick  
19 that up.

20 MS. HUTZLER: Where do you think the gas  
21 price -- are you thinking it's low --

22 CHAIRMAN SELIN: I happen to think gas  
23 will be higher than what people think it will be, but  
24 you have pretty high growth rates and maybe I'm wrong.  
25 FERC thinks it's going to be lower, thinks there's

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1 lots and lots of gas and people will continue to just  
2 consume it based on short-term considerations.

3 MS. HUTZLER: Most people think there's  
4 lots and lots of gas and there are people who forecast  
5 lower prices for gas than we do.

6 CHAIRMAN SELIN: Thank you.

7 MS. HUTZLER: We're pretty well in the  
8 mid-stream of those prices.

9 Okay. I just wanted to make a note that  
10 we did change our modeling system. So last time when  
11 we briefed you we were talking about federal regions,  
12 this time we're going to be talking about different  
13 kinds of supply regions which are NAERC and NAERC  
14 subregion-based and Bob Eynon is going to tell you  
15 more about that.

16 MR. EYNON: The national forecasts which  
17 we've described to you are developed using regional  
18 models of electricity markets and the basis for those  
19 markets are the North American Electric Reliability  
20 Councils and selected subregions. And the reason why  
21 we want to take a look at these regions is that  
22 individual regions show characteristics which are  
23 considerably different from the national average.  
24 Access to fuel supply and the resulting fuel mix are  
25 different among the regions. The ownership of the

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1 electricity supplies, whether they are investor owned  
2 utilities, publicly provided, or non-utility  
3 suppliers, result in differences in prices.

4 In EIA's 1992 Electric Power Annual the  
5 average industrial price for electricity nation-wide  
6 is 4.8 cents per kilowatt hour. However, if you look  
7 at the price for electricity in Washington State, the  
8 industrial price for that year was 2.2 cents per  
9 kilowatt hour, and in Rhode Island it was 9.2 cents a  
10 kilowatt hour, so a factor of four variation due to  
11 access of supplies and the ownership patterns. So for  
12 that reason we want to take a look at regions.

13 CHAIRMAN SELIN: The people in Washington  
14 still think they're being over-charged for electricity  
15 even at the lowest rate.

16 MR. EYNON: What I would propose to do  
17 here is to go through these regions by making two  
18 counterclockwise circuits around the country,  
19 beginning first in Ohio, going up through the Midwest  
20 and down through the Southwest and up the East Coast,  
21 and then a second circuit from the Rocky Mountains up  
22 through the Northwest and California. So, as we go  
23 through this, you might want to keep that in mind.

24 (Slide) Next chart, please.

25 Perhaps I ought to explain this chart a

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1 little bit. The icons represent the U.S. average for  
2 the particular fuel share. The bar on the left  
3 represents 1990 and the bar on the right represents  
4 2010. We're going to begin by looking at ECAR, which  
5 is the region centered around Ohio and the states that  
6 adjoin it.

7 One thing that we can observe from Ohio is  
8 that coal dominates the generation in this region.  
9 It's substantially higher than the national average.  
10 In terms of meeting needs in the future, this region  
11 is expected to need a substantial amount of capacity  
12 which will be met by coal.

13 CHAIRMAN SELIN: Mr. Eynon, for us it  
14 would be most useful to spend relatively more time in  
15 those areas that have average or above average nuclear  
16 stuff.

17 MR. EYNON: Okay.

18 CHAIRMAN SELIN: Because that would affect  
19 the economics of extension and also if there were new  
20 plants they're likely to be in places that already  
21 have nuclear utilities.

22 MR. EYNON: (Slide) Okay. If we could  
23 turn to the next chart then, that might be of more  
24 interest.

25 COMMISSIONER REMICK: Incidentally, just

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1 a side interest. I come from Pennsylvania and because  
2 of that Ohio use of coal it rains vinegar at times in  
3 Central Pennsylvania literally, the pH equivalent to  
4 vinegar.

5 MR. EYNON: MAIN is an area which includes  
6 Illinois, Eastern Michigan and -- I'm sorry.

7 CHAIRMAN SELIN: A very heavy nuclear  
8 area?

9 MR. EYNON: Yes. Eastern Wisconsin, I'm  
10 sorry, and Western Michigan. It's typical of the  
11 regions of the country except that it has more  
12 nuclear. Here again we're expecting most of the  
13 growth to be met with coal. We are projecting  
14 retirements of nuclear plants. We have Dresden 2  
15 retiring and Point Beach 1 retiring over this period.  
16 As a result, the nuclear contribution in this region  
17 is expected to decline.

18 CHAIRMAN SELIN: Do you have charts that  
19 show growth rates by region?

20 MR. EYNON: I can indicate what they are.  
21 In this region, sales growth rate is 1.2 percent.

22 CHAIRMAN SELIN: That's really almost more  
23 relevant than the share for what's of interest to us.

24 MR. EYNON: Electricity sales are  
25 projected in MAIN to grow at 1.2 percent.

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1 CHAIRMAN SELIN: And what about price?

2 MR. EYNON: Price is projected to grow at  
3 .8 percent.

4 CHAIRMAN SELIN: So that's considerably  
5 higher than --

6 MR. EYNON: It's considerably higher than  
7 the national average of .3 percent.

8 CHAIRMAN SELIN: Why is that, so much  
9 nuclear?

10 MR. EYNON: There's a very heavy capital  
11 component associated with the nuclear plants in that  
12 region.

13 CHAIRMAN SELIN: But why should that  
14 increase the price? You mean continuing capital?

15 MR. EYNON: Continuing capital additions  
16 that are required. The capital component is driven by  
17 both the additions and the rate of growth of  
18 electricity. So, if the sales rate increased more  
19 rapidly, the capital component is spread over more  
20 kilowatt hours.

21 CHAIRMAN SELIN: So you've got a high  
22 nuclear share and a low growth rate.

23 MR. EYNON: Yes.

24 CHAIRMAN SELIN: So the capital growth  
25 then adds the high price. Okay.

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1 MR. EYNON: I would like to jump ahead  
2 then to the Southern TVA VACAR region. As we  
3 indicated earlier, we are -- this is the one region in  
4 the nation where we expect new nuclear additions.  
5 Watts Bar 1 and 2 and Bellefonte 1 and 2 are scheduled  
6 to be completed over the period. We will be retiring  
7 Robinson 2. Even with the growth of nuclear capacity  
8 in this region, the growth in electricity sales are  
9 such that nuclear loses some of its share, a slight  
10 reduction in its share.

11 CHAIRMAN SELIN: What were those two  
12 rates, the growth rate and the cost rate?

13 MR. EYNON: The sales are 1.5 percent and  
14 prices are -.2 percent. So, this region is actually  
15 increasing capacity more rapidly than any other region  
16 in the nation. I think they need some 30 gigawatts of  
17 capacity by 2010. Even with the nuclear additions  
18 that we're projecting, the share declines for nuclear.

19 CHAIRMAN SELIN: Did the two enrichment  
20 plants fall in this region, Portsmouth and Paducah?

21 MR. EYNON: We have not included those  
22 here.

23 CHAIRMAN SELIN: Well, that's going to  
24 have a terrific impact on demand. They each use 4,000  
25 to 8,000 megawatts. If one of them closes, which a

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1 lot of people think is going to happen, that will have  
2 a really discernible impact on demand. But I'm not  
3 sure whether it's in this region or the Ohio, Illinois  
4 region.

5 COMMISSIONER REMICK: Ohio. I'm not sure  
6 either.

7 CHAIRMAN SELIN: I mean you might not see  
8 it so much on the national basis, but that would have  
9 a really large regional impact.

10 MR. EYNON: If we could move on then to  
11 the next region, which is Florida, a subregion of the  
12 same council. Florida is characterized by a somewhat  
13 atypical mix of capacity in that it has somewhat less  
14 coal than the nation on average.

15 CHAIRMAN SELIN: The price is that high?  
16 I didn't realize it was that high.

17 MR. EYNON: But it's much more dependent  
18 on oil.

19 CHAIRMAN SELIN: This is electricity  
20 generated in Florida or consumed in Florida?

21 MR. EYNON: Generated.

22 CHAIRMAN SELIN: That's interesting. I  
23 didn't realize they still had that much coal.

24 MR. BEAMON: Some of that coal serving in  
25 this is right up there in Georgia. They're buying it.

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1 MR. EYNON: This is generation.

2 MR. BEAMON: There are a couple plants  
3 that even though they're geographically outside of  
4 Florida, they're owned by Florida. If they're owned  
5 by Florida and operated to dispatch against Florida,  
6 we included them in the Florida plants. There are  
7 several of those.

8 CHAIRMAN SELIN: And what were your growth  
9 rates for this?

10 MR. EYNON: In Florida, sales of 1.6  
11 percent and price is .3 percent, same as the national  
12 average for prices.

13 CHAIRMAN SELIN: I thought people were  
14 projecting a greater growth rate in electricity in  
15 Florida. I'm surprised it's not higher. That's still  
16 pretty high.

17 MR. EYNON: It's higher than our national  
18 average.

19 CHAIRMAN SELIN: And why does the nuclear  
20 drop so much?

21 MR. EYNON: Turkey Point 3 and 4 are  
22 retired close to the end of the period and it reduces  
23 the nuclear share and gas gains over the period.

24 CHAIRMAN SELIN: I think that's very  
25 unlikely to happen, by the way. If, in fact, you have

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1 this rate of electricity growth and particularly in  
2 South Florida, Turkey Point would be high candidates  
3 for plant life extension.

4 MR. EYNON: Turning next to the Mid-  
5 Atlantic Area Council, that's the Pennsylvania,  
6 Jersey, Maryland system. Again, this region is  
7 characterized with higher nuclear share than the  
8 average. Over the period, we're projecting Peach  
9 Bottom 2 and 3 to retire as well as Oyster Creek. As  
10 a result, the nuclear share declines here.

11 CHAIRMAN SELIN: What's the growth rate  
12 for this area?

13 MR. EYNON: Sales are .8 percent and price  
14 is .1 percent. So it has more sluggish growth than  
15 the rest of the nation. Most of the increased demand  
16 is going to be met with coal and natural gas and some  
17 renewables, mostly wind.

18 CHAIRMAN SELIN: Are these new coal plants  
19 or are they just getting --

20 MR. EYNON: These are new coal plants  
21 after the turn of the century.

22 CHAIRMAN SELIN: I find it hard to see  
23 nuclear closing and new coal plants being built at the  
24 same time. I mean, Peach Bottom is a pretty good  
25 plant. I can't really predict what the utilities

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1 would do, but, given that combination, they'd be  
2 tempted to keep their nuclear capacity instead of  
3 reducing that and adding coal. If you really want to  
4 generalize, those regions that already have a lot of  
5 nuclear, it's less likely that they will close the  
6 nuclear plants and add coal capacity. Those regions  
7 that don't have much nuclear, you know, obviously  
8 don't have the nuclear option. They would probably  
9 add a lot of coal.

10 MR. EYNON: The next region of interest is  
11 New York. Here we have a region which is  
12 characterized with substantially less coal than the  
13 national average and much more dependence on oil and  
14 natural gas. During the forecast period, we're  
15 projecting that Nine Mile Point 1 will retire and  
16 Ginna will retire.

17 CHAIRMAN SELIN: We actually have a  
18 relatively large number of troubled plants, nuclear  
19 plants from an economic point of view. If anything,  
20 it's more likely to be the other way. The price  
21 pressure on Indian Point and Nine Mile is  
22 considerable. Is there new capacity being added here?

23 MR. EYNON: Well, this region -- if you  
24 turn to the next chart, you can see what's going on.

25 (Slide) Utilities actually generate less

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1 in the future in this region than they are currently  
2 generating today because demand growth is very  
3 sluggish. I didn't give you those numbers. Sales in  
4 this region, growth is the lowest in the nation. It's  
5 .4 percent and prices are projected to grow at  
6 slightly faster than the national average of .4  
7 percent also.

8 CHAIRMAN SELIN: They're already very  
9 high.

10 MR. EYNON: We'll get to that in just a  
11 second.

12 (Slide) In the next chart you can see  
13 that utilities are projected to generate less  
14 electricity in the future, be more dependent on non-  
15 utility sources as well as purchased power from other  
16 utilities, principally from PJM and from Canadian  
17 electricity sources. So, even though we're quite  
18 pessimistic about growth of Canadian imports, there  
19 are some inputs coming to this region.

20 (Slide) The next chart shows you what  
21 happens to price in this region. The chart shows the  
22 U.S. price and the New York price currently hovering  
23 around ten cents a kilowatt hour. It's projected to  
24 grow in the future to be at roughly about 10.5 cents  
25 a kilowatt hour compared with the national average of

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1 7.6 cents a kilowatt hour. The reason why the price  
2 grows here whereas in other regions it doesn't grow  
3 has to do with the capital component again. The  
4 capital component, rather than declining, is  
5 increasing. Because sales growth is so slow, the  
6 kilowatt hour charge per dollar capital is higher than  
7 it would be otherwise.

8 (Slide) I'd like to turn next to New  
9 England, which has a higher nuclear share than the  
10 typical region, substantially less coal. The story  
11 here is somewhat similar to New York. The sales  
12 growth rate in this case is .7 percent, slightly more  
13 than New York but substantially below the national  
14 average, and prices again are projected to grow at .4  
15 percent.

16 We're projecting that Haddam Neck and  
17 Maine Yankee as well as Millstone would retire over  
18 the period, so the nuclear share declines. The  
19 nuclear share decline, of course, is a combination of  
20 available capacity plus the assumptions about the  
21 performance of plants. We do in each of these regions  
22 assume improving the performance from its current  
23 rates up to 74 percent, so the results here are the  
24 combination of the assumptions about performance and  
25 the available capacity.

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1                   (Slide) This region, in terms of total  
2 capacity, you can see from the next chart is similar  
3 to New York in that they're expected to generate less  
4 electricity. Utilities are expected to generate less  
5 electricity in the future than they are today. Eleven  
6 percent of their supplies will come from purchases and  
7 imports and 23 percent are projected to come from  
8 NUGs. That means almost well over a third of the  
9 power in this region is going to be provided by other  
10 than utilities.

11                   (Slide) Again we have, in the following  
12 chart, we show what the prices are. It's a story  
13 that's very similar to New York, prices currently  
14 running at nine cents a kilowatt hour and projected to  
15 remain at that level. There is a slight attenuation  
16 in the capital component of prices which keeps the  
17 price from growing even more quickly than it would  
18 otherwise.

19                   (Slide) I'd like to skip some regions now  
20 and move on to California, which is near the end.  
21 This region has substantially less coal than the  
22 nation on average and depends much more heavily on  
23 gas, principally fired in steam plants, not the new  
24 combined cycle plants that we're talking about.

25                   In terms of the nuclear contribution we

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1 expect it to decline in the future because of the  
2 retirement of San Onofre which has already occurred,  
3 Diablo Canyon, Diablo Canyon 1 and 2. The renewables  
4 contribution is expected to increase principally  
5 because of geothermal increases some 30 billion  
6 kilowatt hours over the period. This region has  
7 substantially higher prices than the nation in  
8 general. The sales increases here are 1.4 percent and  
9 prices .8 percent.

10 What's interesting about California also  
11 is that about 35 percent of the power in 2010 is  
12 projected to come from non-utility supplies and  
13 imports into the region, purchase of power expected to  
14 be 28 percent. So fully almost two-thirds of the  
15 power in this region is going to come from other than  
16 utility sources.

17 (Slide) I'd like to spend just a minute  
18 or two than dealing with some of the uncertainties  
19 associated with this forecast.

20 Since we've already indicated demand is a  
21 huge -- there's a substantial amount of uncertainty  
22 associated with demand growth because of uncertain  
23 economic growth, technological choice that's assumed  
24 in the end use side as well as the impacts of EPAct.

25 We've made some assumptions about oil and

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1 gas price expectations. We've incorporated an  
2 adaptive expectation into this model. What planners  
3 actually use for decision making could be different  
4 and it would result in perhaps different decisions  
5 being made.

6 As has been indicated, there is a  
7 substantial amount of uncertainty about demand side  
8 management programs, whether as we move into a more  
9 competitive environment these programs will persist  
10 and whether the levels of expenditures that we've  
11 assumed for demand side management programs will  
12 actually be realized.

13 The climate action plan has not been  
14 incorporated in this analysis and if it were would  
15 perhaps change the results in significant ways and  
16 would have serious impacts on fossil fuels, especially  
17 coal.

18 And finally, technological development,  
19 changes in efficiencies and electric technologies and  
20 penetration of electric vehicles and the like could  
21 also have substantial impacts on the results.

22 CHAIRMAN SELIN: This is very interesting.  
23 Could I come back to the gas price?

24 MS. HUTZLER: Yes.

25 CHAIRMAN SELIN: If drilling you just

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1 assume is so much per thousand cubic feet, it's a  
2 continuous price, is this also for pipeline or do you  
3 have quantum increases as you go above certain levels?

4 MS. HUTZLER: It increases when you go  
5 over certain levels.

6 CHAIRMAN SELIN: And it's done in a  
7 quantum, not just an increased -- it's not just an  
8 increased cost of gas above a certain volume but a  
9 fixed increase for a pipeline and then you get to  
10 spread it over more and more gas up to a point and  
11 then another pipeline?

12 MS. HUTZLER: That's correct.

13 CHAIRMAN SELIN: I think I was wrong. I  
14 think you've got reasonably realistic estimates of gas  
15 price. I doubt that they could go up much faster than  
16 you've estimated.

17 Ken?

18 COMMISSIONER ROGERS: No, I don't have any  
19 questions.

20 CHAIRMAN SELIN: Commissioner Remick?

21 COMMISSIONER REMICK: No, I find it very  
22 interesting and I realize that -- I guess I don't  
23 question the models. The outcomes depend upon the  
24 assumptions and one has to make certain assumptions.  
25 There's no question about it. There might be some as

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1 an individual I would disagree, but you're presumably  
2 the experts on these things.

3 I would ask a question. How much are  
4 these assumptions based on your best technical  
5 estimates aside from any political input into that?  
6 I'm not talking about political when you have laws  
7 into effect and so forth, but is it truly your best  
8 professional technical inputs into these or whoever is  
9 providing the inputs?

10 DOCTOR HAKES: We have both statutory  
11 protection as well as I think protection by custom  
12 that there is -- the Policy Office, for instance, at  
13 the Department of Energy may have one set of figures.  
14 The Climate Action Plan may have a set of figures. We  
15 independently arrive at our own set of figures. We  
16 will sometimes circulate publications to industry and  
17 other people for technical advice, but these represent  
18 really EIA's version, EIA's position and not  
19 necessarily the Department of Energy's position.

20 COMMISSIONER REMICK: Fine. In my past  
21 life, I used to subscribe to a number of your  
22 publications on electricity consumption and energy  
23 consumption and so forth. I found them very, very  
24 good and interesting. I have not used them as much in  
25 recent years, but I think you put out some very very

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1 interesting information.

2 DOCTOR HAKES: Thank you.

3 COMMISSIONER REMICK: It would be very  
4 interesting if your models somehow you'd go back maybe  
5 15 or 10 years ago and say if we had this model then  
6 and knowing what we do then what the projections would  
7 have been for 1994, 1993.

8 Thank you very much.

9 CHAIRMAN SELIN: Commissioner de Planque?

10 COMMISSIONER de PLANQUE: I just have a  
11 couple questions.

12 Does your model account for possible  
13 social changes, for example population shifts in areas  
14 of the country?

15 MS. HUTZLER: We do look at that and track  
16 what the Census Bureau tells us about population and  
17 growth. For instance, they just made a change where  
18 there are more immigrants coming in the country than  
19 they thought and the birth rate is actually different  
20 than what they previously had and we factor all those  
21 things in on a regional basis.

22 COMMISSIONER de PLANQUE: In terms of  
23 forecasting as well?

24 MS. HUTZLER: Yes.

25 COMMISSIONER de PLANQUE: What about

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1 things as difficult to get your arms around as shifts  
2 in work place with the computer age and all of that,  
3 potential shifts with more people working at home  
4 rather than in centralized businesses? Does anything  
5 like that get taken into account?

6 MS. HUTZLER: That's more difficult and  
7 less of that's taken into account because we do that  
8 based on past data.

9 COMMISSIONER de PLANQUE: Sure.

10 MS. HUTZLER: Those trends aren't there  
11 and it is pretty difficult to do that, so we're not as  
12 good on that.

13 COMMISSIONER de PLANQUE: Okay. On page  
14 174 of your report you give about five factors that  
15 you say are most likely responsible for no new orders  
16 in the nuclear area. Can you tell me how you derive  
17 those factors or what they're based on? If you need  
18 refreshment, I can tell you what they are.

19 MS. HUTZLER: No. I think we have those  
20 memorized.

21 COMMISSIONER de PLANQUE: Okay. One of  
22 them caught my eye, the uncertainty in licensing and  
23 regulatory process, but the rest of them have to do  
24 with public concerns. What do you base those on?

25 MR. HEWITT: Public concerns in the

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1 financial markets.

2 COMMISSIONER de PLANQUE: So these are all  
3 based on financial assessments?

4 MR. HEWITT: No. Maybe I don't understand  
5 your question.

6 COMMISSIONER de PLANQUE: Well, you give  
7 five factors why you assume no nuclear plants would be  
8 built and I'm trying to figure out what's the basis of  
9 establishing those five factors. How do you know --

10 MR. HEWITT: It's our own judgment based  
11 upon readings in the financial market and the  
12 political arena.

13 COMMISSIONER de PLANQUE: So these aren't  
14 based on any surveys, necessarily, of utilities? This  
15 is just your own thinking on these items?

16 MR. HEWITT: It's our own expert judgment.

17 MS. HUTZLER: Now, you should realize that  
18 we're saying no nuclear plants through the year 2010.

19 COMMISSIONER de PLANQUE: Right.

20 MS. HUTZLER: That doesn't mean that --

21 COMMISSIONER de PLANQUE: Yes, I  
22 understand.

23 MS. HUTZLER: -- 2010 period. We would  
24 assess that differently.

25 COMMISSIONER de PLANQUE: Okay. Thank you

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1 very much. I appreciate this, very interesting.

2 CHAIRMAN SELIN: Doctor Hakes, would you  
3 talk a little bit about other people's projections?  
4 Is the structure -- in your report, you compare this  
5 with four or five other projections. Would the  
6 structures be fairly similar in terms of ratio between  
7 electricity growth rate and overall energy or  
8 electricity and GDP?

9 MS. HUTZLER: Okay. We're showing a lower  
10 electricity demand forecast than --

11 CHAIRMAN SELIN: Than anybody else.

12 MS. HUTZLER: Yes, that's very true. In  
13 the other areas we're pretty close and we're pretty  
14 much midstream, such as in the gas price that you were  
15 asking before, and the difference is because of the  
16 further treatment of efficiency standards due to the  
17 National Appliance Energy Conservation Energy Act and  
18 EAct that we came down. It will be interesting to  
19 see if other forecasters do --

20 CHAIRMAN SELIN: So you just think the  
21 others haven't caught up yet?

22 MS. HUTZLER: That's one part of the  
23 thinking. DOE policy is actually below us. When they  
24 did their Climate Change Action Plan they did a new  
25 baseline. They're at 1.1 percent for electricity, so

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1 they're slightly below us. There are changes that are  
2 taking place that people haven't updated yet. Whether  
3 we'll be midstream in the future or not, I don't know.

4 CHAIRMAN SELIN: I see.

5 MS. HUTZLER: And I'm not even sure what  
6 our forecast will be next year because there are a lot  
7 of different things going on, as you even brought up,  
8 one of which is deregulation, how that will affect the  
9 electricity price and how that will affect demand.

10 CHAIRMAN SELIN: You know, obviously we're  
11 very sensitive to stuff which for you is pretty  
12 peripheral, which is whether there are 109 or 106 or  
13 104 nuclear power plants, and I realize that these are  
14 pretty broad estimates. And I sort of apologize, but  
15 we're not really apologizing. We just want to call  
16 your attention to, you know, a U.S. government  
17 publication says no new orders until 2010 at the same  
18 time as we're killing ourselves to certify new  
19 designs. Nevertheless, I don't think this really has  
20 much of an effect on your overall figures, but it  
21 might be useful to discuss some of these regional  
22 extension assumptions. I think as you get into region  
23 by region they become relatively more important.

24 And this is a nice card. It looks like it  
25 was done just for us. We appreciate it.

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1 DOCTOR HAKES: Our model takes 24 hours  
2 sometimes to run on a mainframe computer. This card  
3 has a run time of about five seconds. It has quite a  
4 bit on it.

5 CHAIRMAN SELIN: Actually, in '74 and '75,  
6 I was a consultant to the FEO and worked with the  
7 people who were setting up EIA, so it's very  
8 satisfying to me to see how the organization has grown  
9 in not only size but in stature and independence.

10 We thank you very much for the reports and  
11 you're to be congratulated on just the extent of the  
12 work and the robustness of the things that you do, so  
13 thank you very much for coming.

14 DOCTOR HAKES: We're available for  
15 additional analysis, if you would like.

16 CHAIRMAN SELIN: I do hope you will come  
17 back next year when you have your next set of things  
18 done and I would appreciate if you could just do that  
19 breakdown of the electricity market at different price  
20 levels. That would be helpful.

21 MS. HUTZLER: We would be more than happy  
22 to work with you in terms of looking at each of these  
23 plants on a regional basis. If there's somebody you  
24 want us to work with, we'll be happy to do that.

25 CHAIRMAN SELIN: I just think we'll know

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1 a lot more in three months than we do now. I mean, I  
2 could give you my guesses on region, but they're going  
3 to change drastically. But once we get the rule out  
4 and people have a chance to comment on it, and that's  
5 imminently, then I think we'll have a much clearer  
6 idea of what people are intending in terms of  
7 extending licenses.

8 MS. HUTZLER: Well, a compact, we can try  
9 to incorporate that in our next round of projections.

10 CHAIRMAN SELIN: Okay. Fine. Thank you  
11 very much.

12 DOCTOR HAKES: We thank you.

13 (Whereupon, at 11:50 a.m., the above-  
14 entitled matter was adjourned.)  
15  
16  
17  
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25

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CERTIFICATE OF TRANSCRIBER

This is to certify that the attached events of a meeting  
of the United States Nuclear Regulatory Commission entitled:

TITLE OF MEETING: BRIEFING ON ELECTRICITY FORECAST FROM ENERGY  
INFORMATION ADMINISTRATION (EIA) ANNUAL ENERGY OUTLOOK  
PLACE OF MEETING: ROCKVILLE, MARYLAND

DATE OF MEETING: JUNE 8, 1994

were transcribed by me. I further certify that said transcription  
is accurate and complete, to the best of my ability, and that the  
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Carol Lynch

Reporter's name: PETER LYNCH

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**Electricity Supply and Demand  
Through 2010**

**Presented to the**

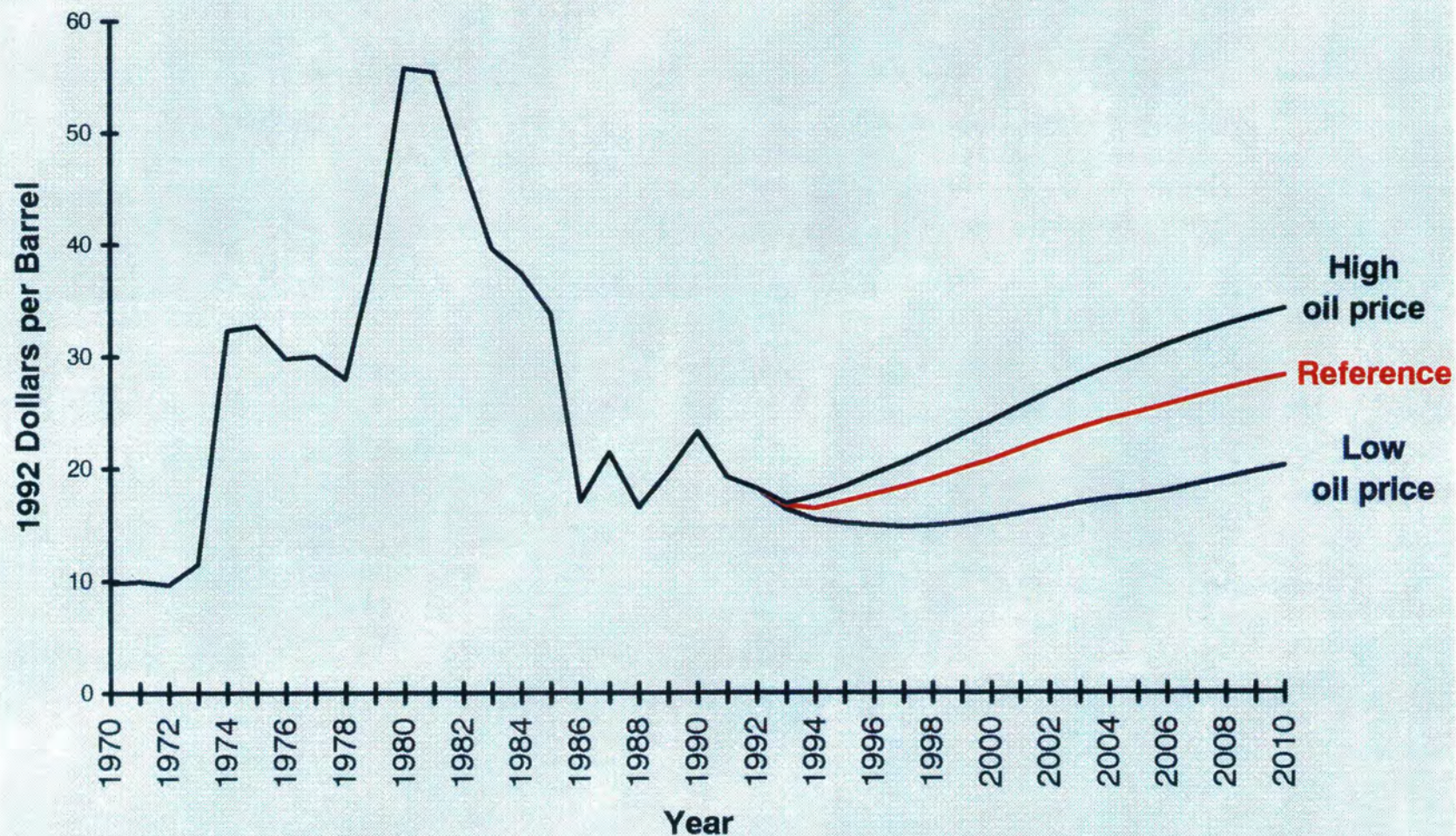
**Nuclear Regulatory Commission  
June 8, 1994**

## **Briefing Agenda**

- **Major Assumptions**
- **National Electricity Supply**
- **Regional Electricity Review**
- **Uncertainties**

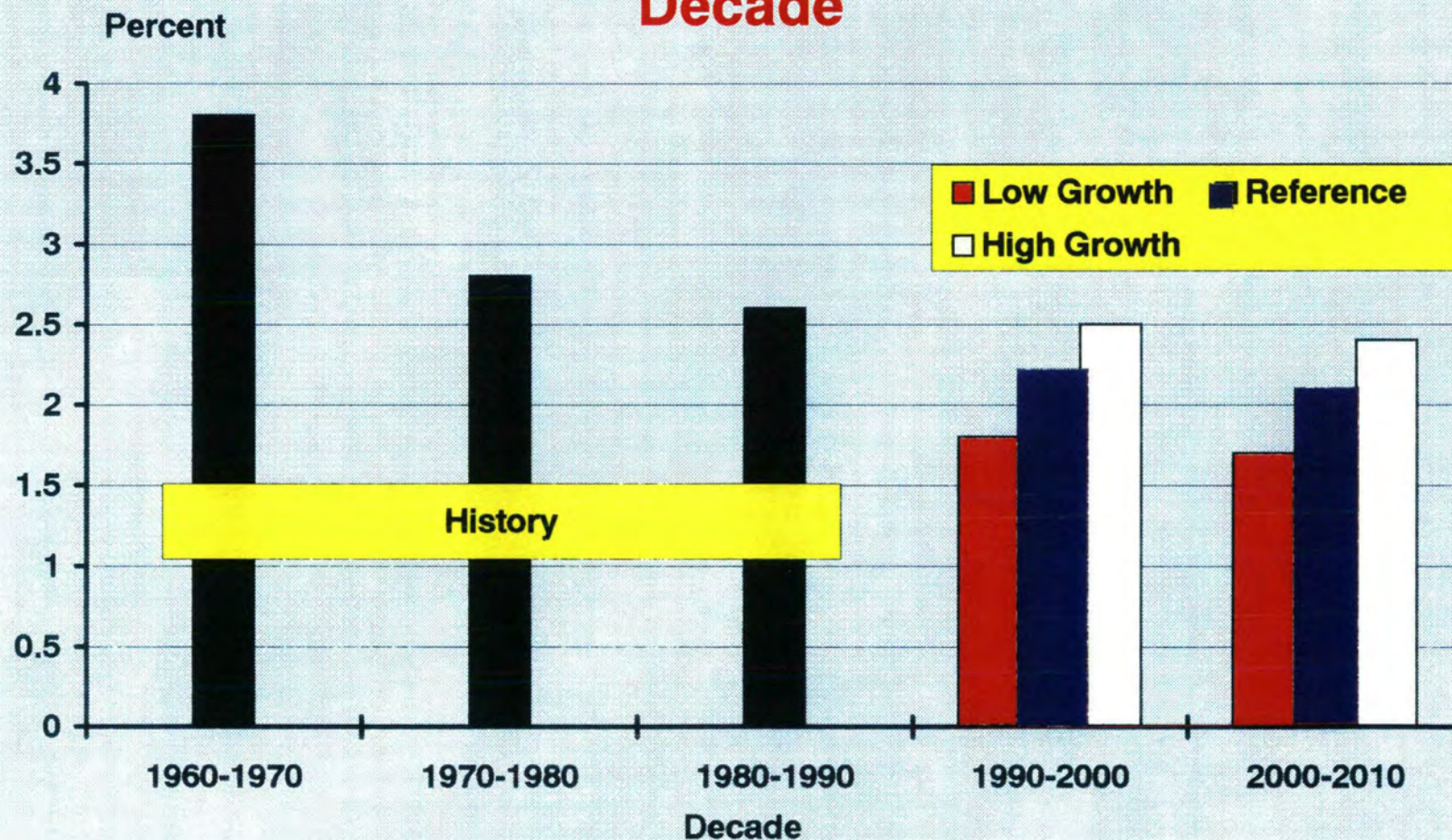


## World Oil Prices



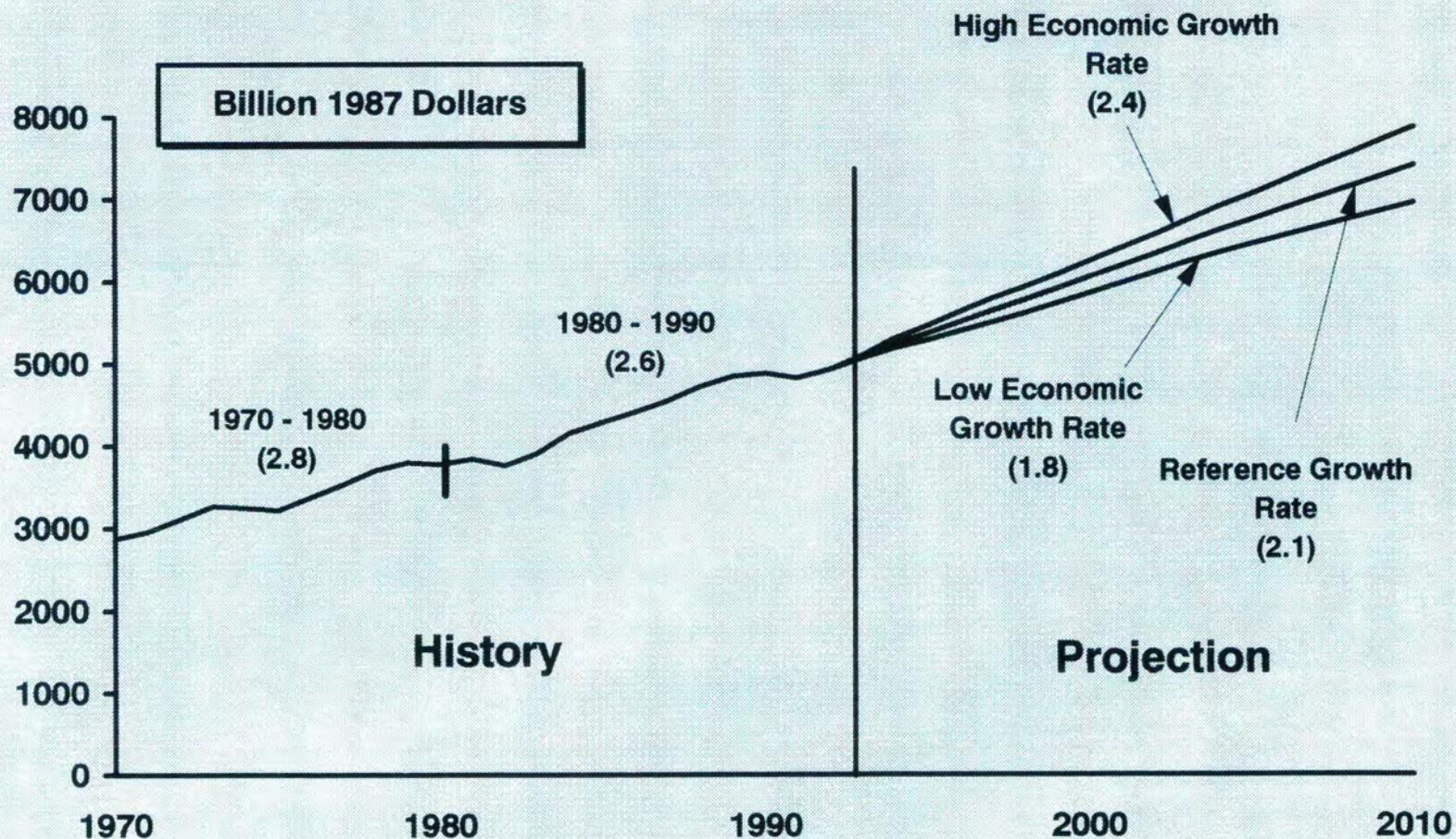


## Average Annual Real GDP Growth by Decade



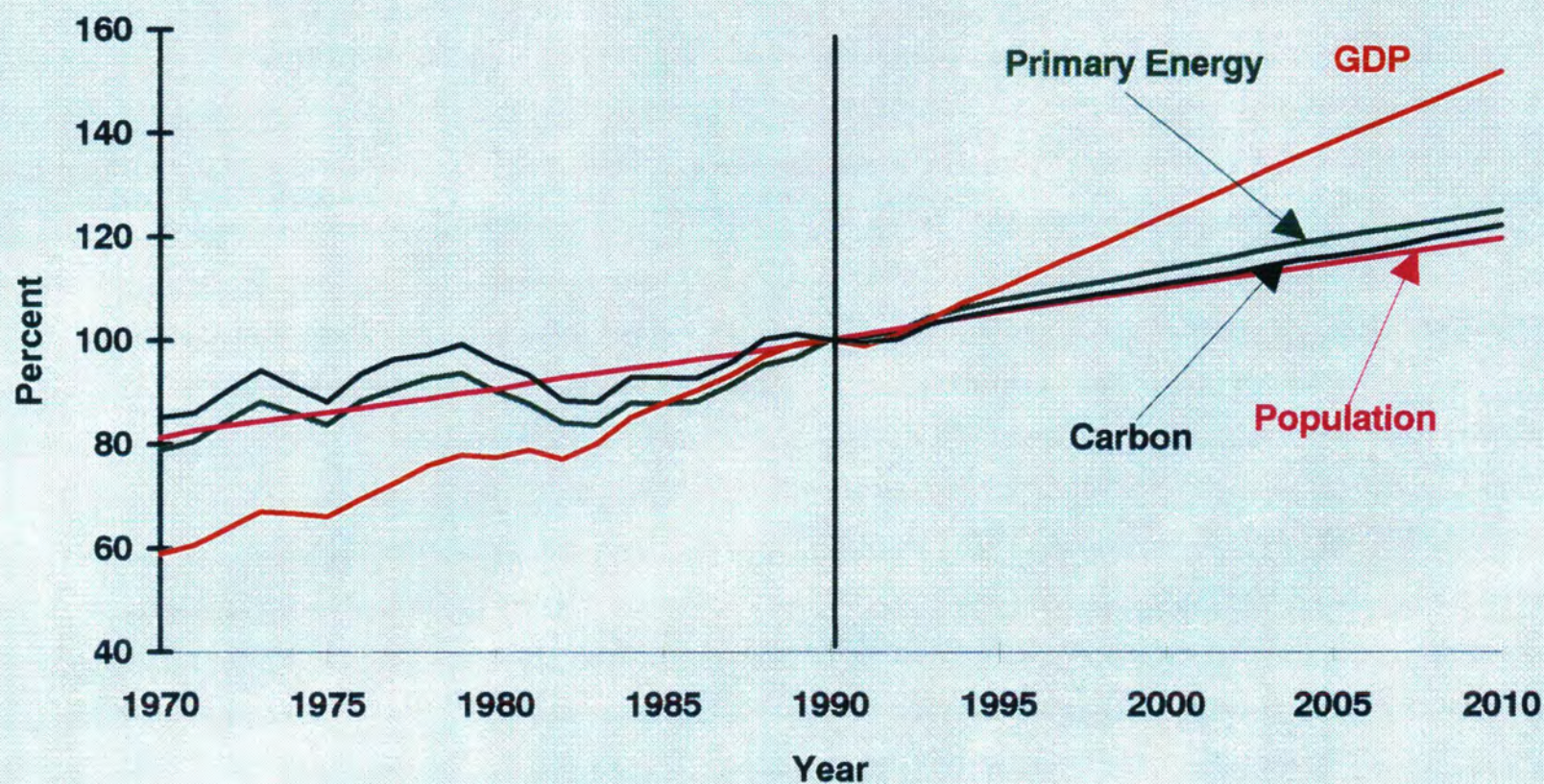


## U.S. Gross Domestic Product 1970 - 2010



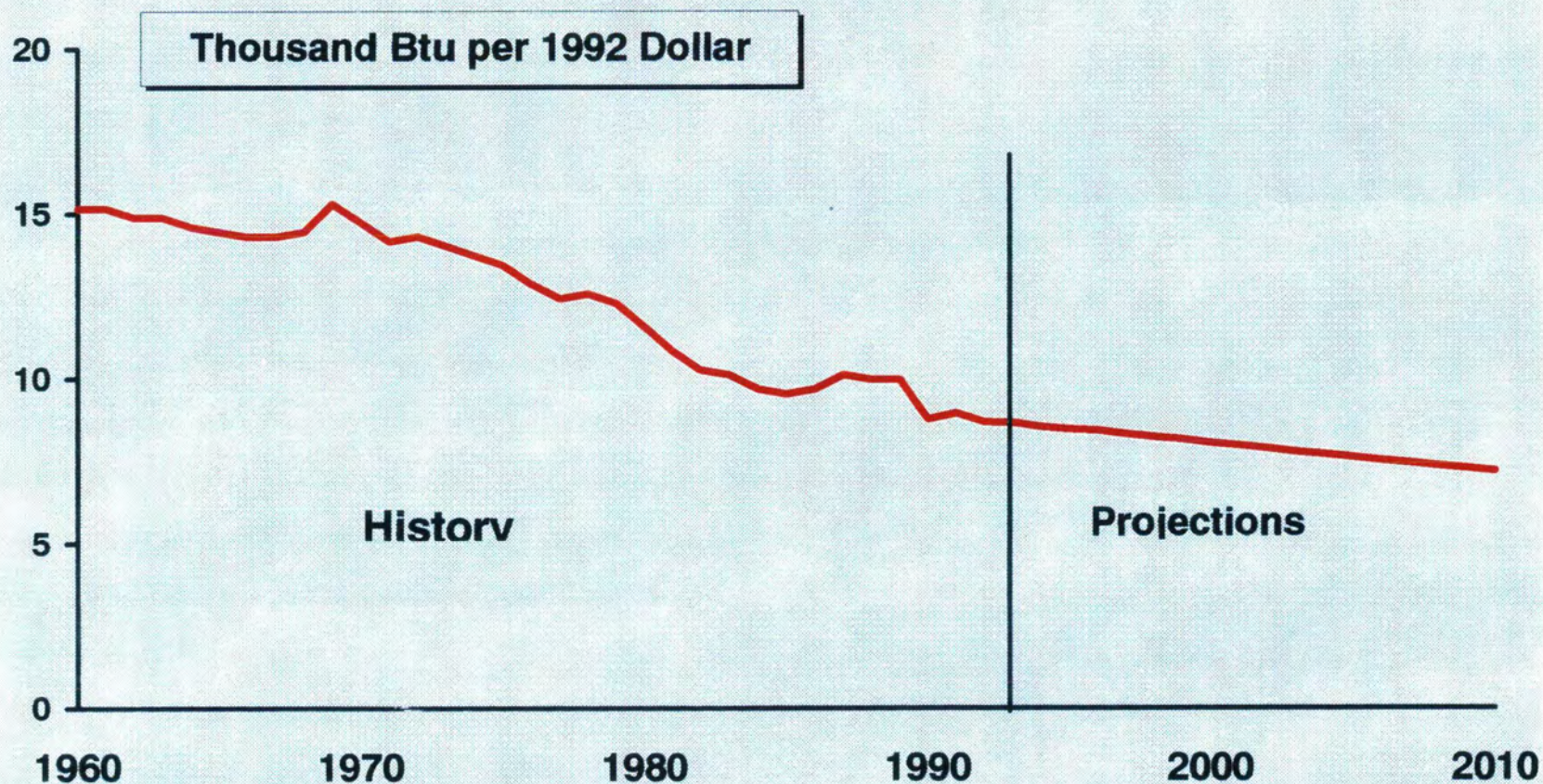


**Indices of Economic Growth, Energy Consumption,  
Population and Carbon Emissions (1990=100)**



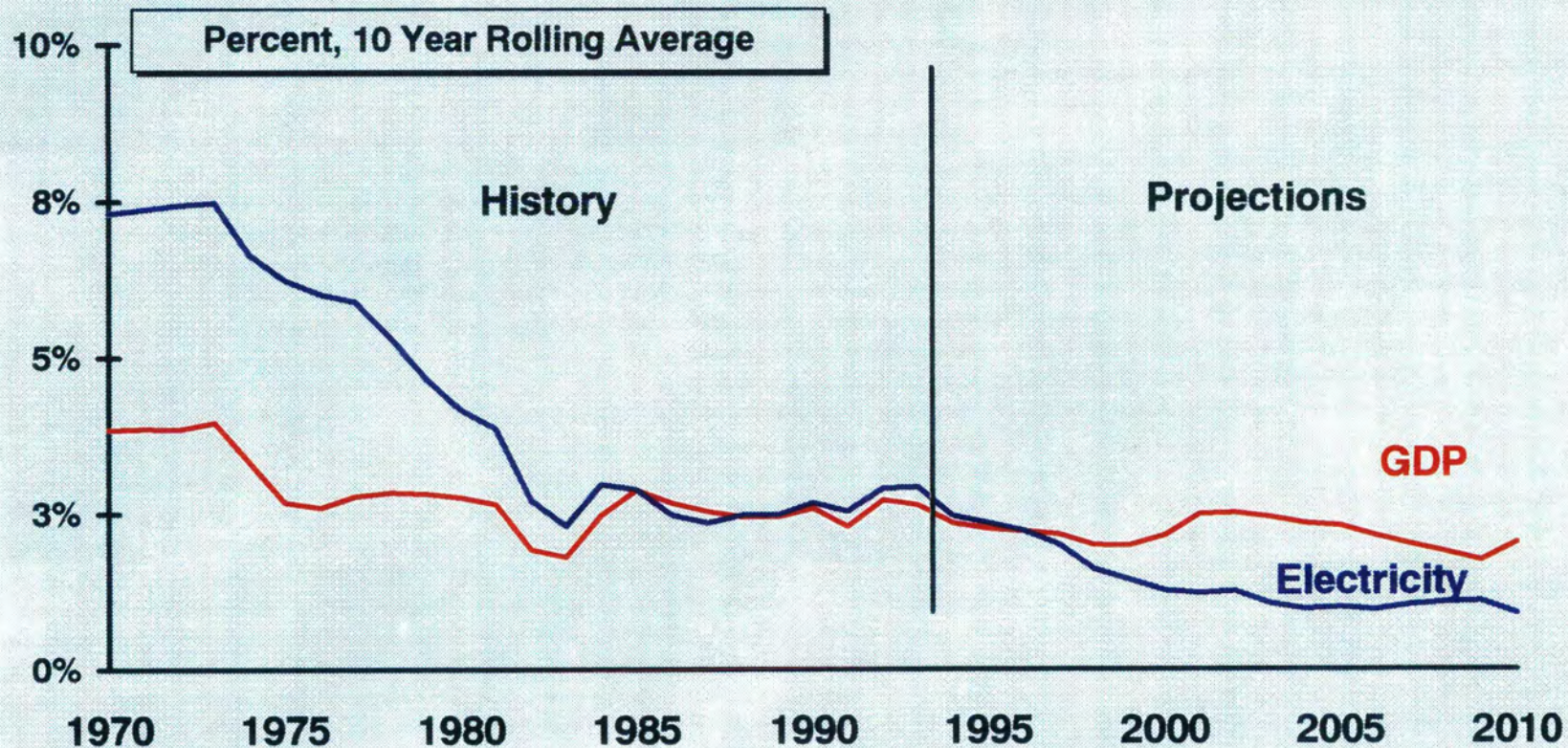


## U.S. Industrial Energy Intensity 1960 - 2010



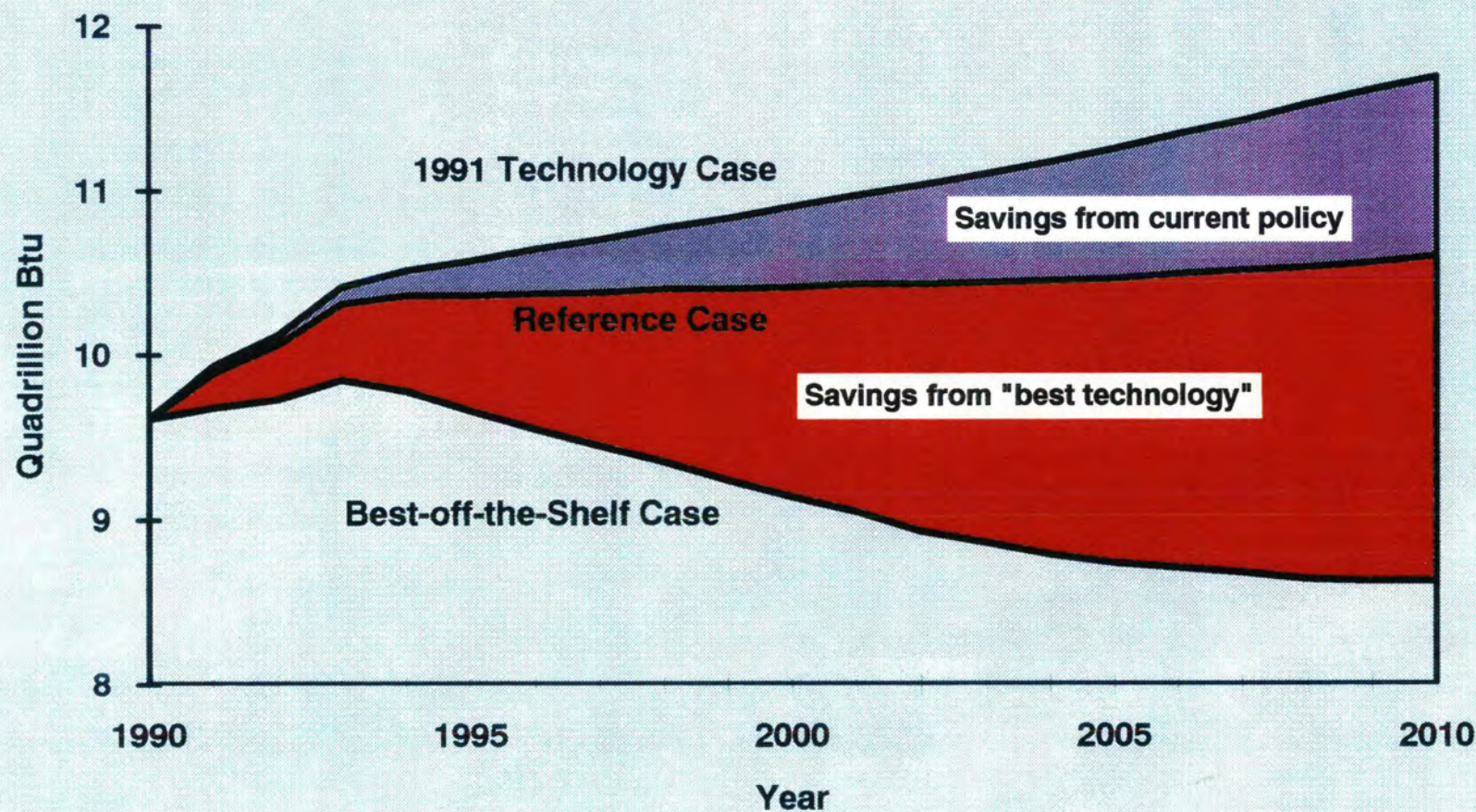


## Electricity Sales and Economic Growth Rates 1970 - 2010



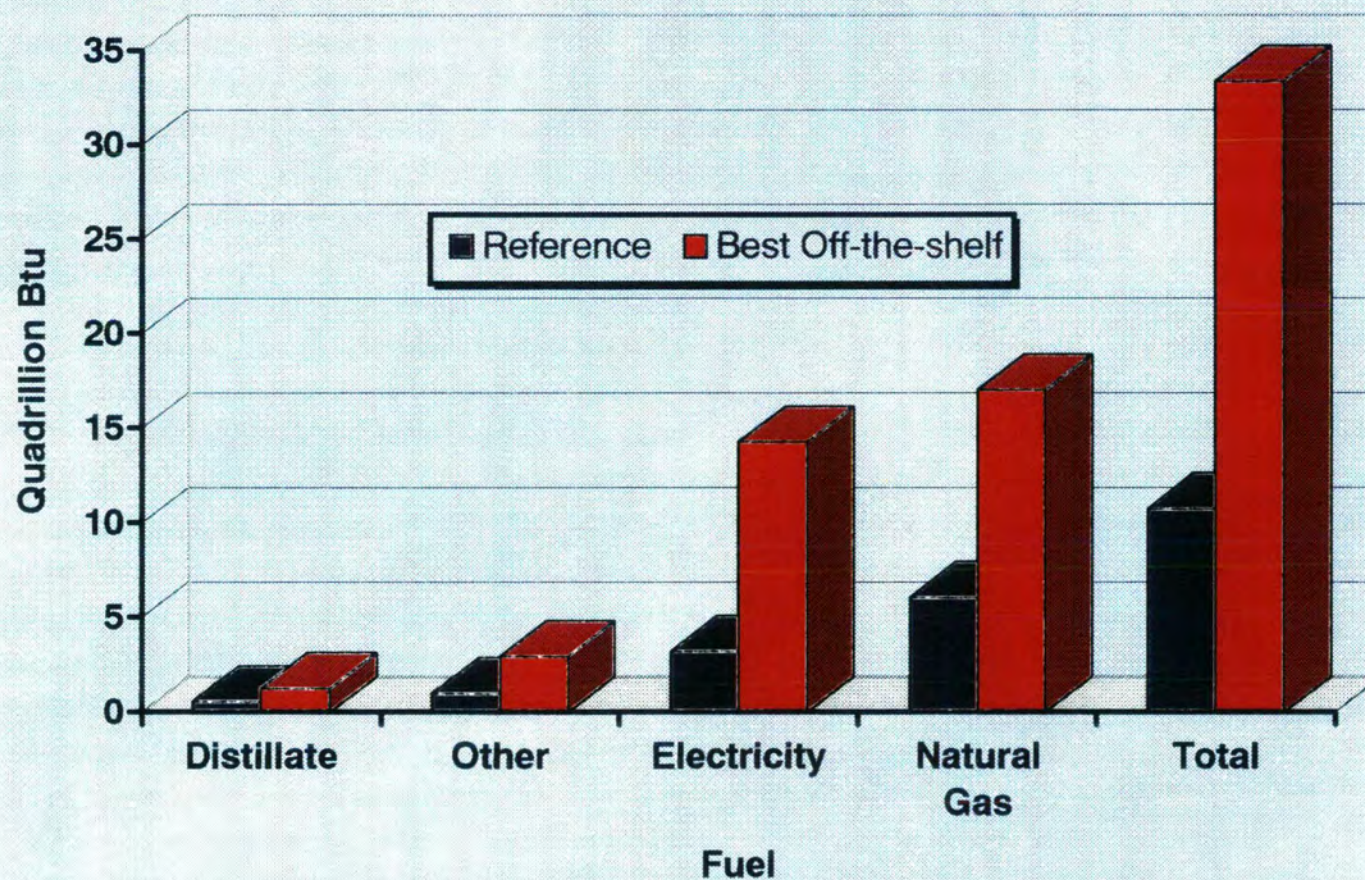


## Residential Energy Consumption in Three Scenarios, 1990-2010



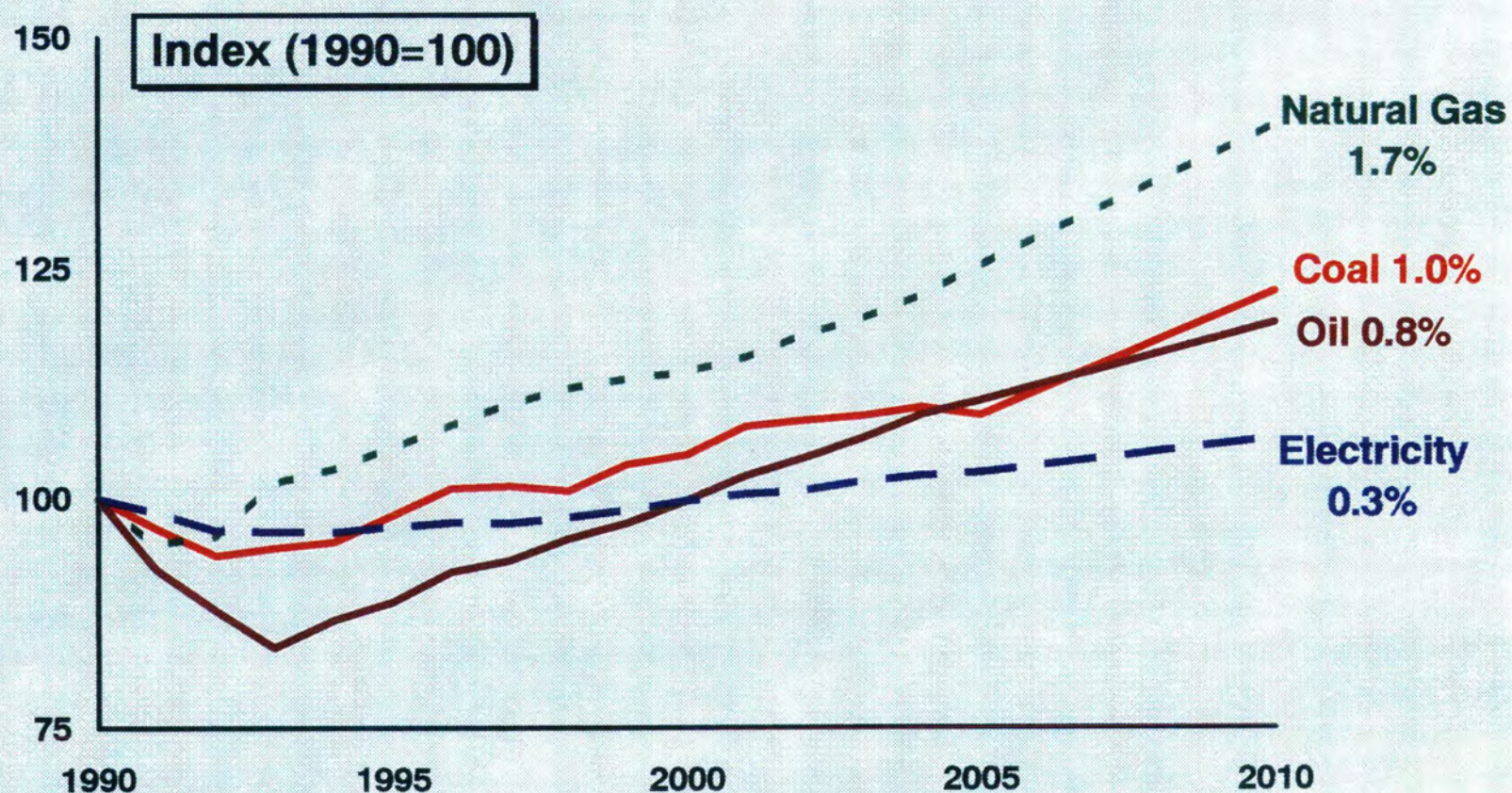


**Cumulative Energy Savings From Efficiency Gains  
in Two Scenarios, Residential Sector, 1990-2010**



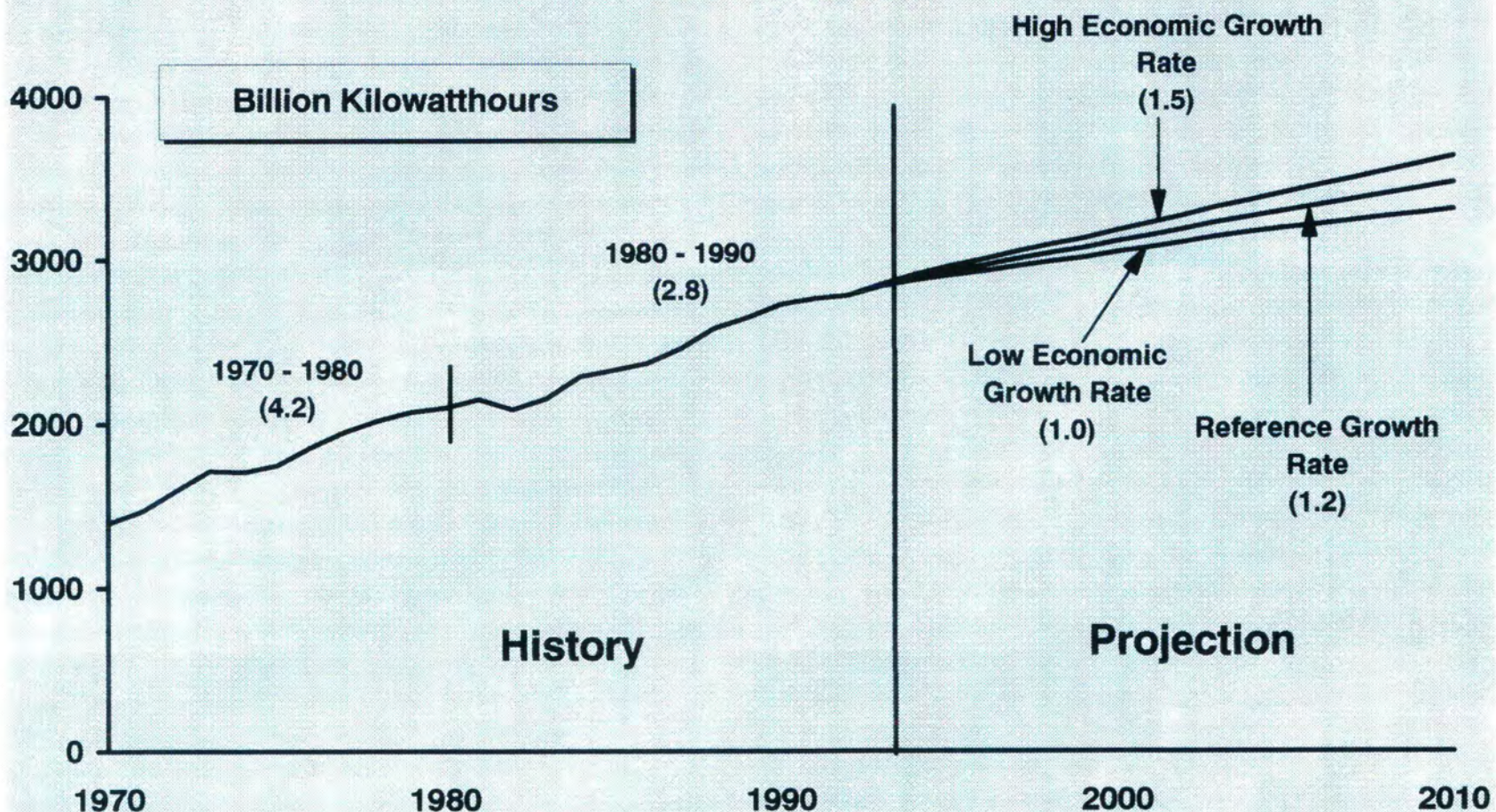


## Energy Prices : Relative Indices 1990 - 2010



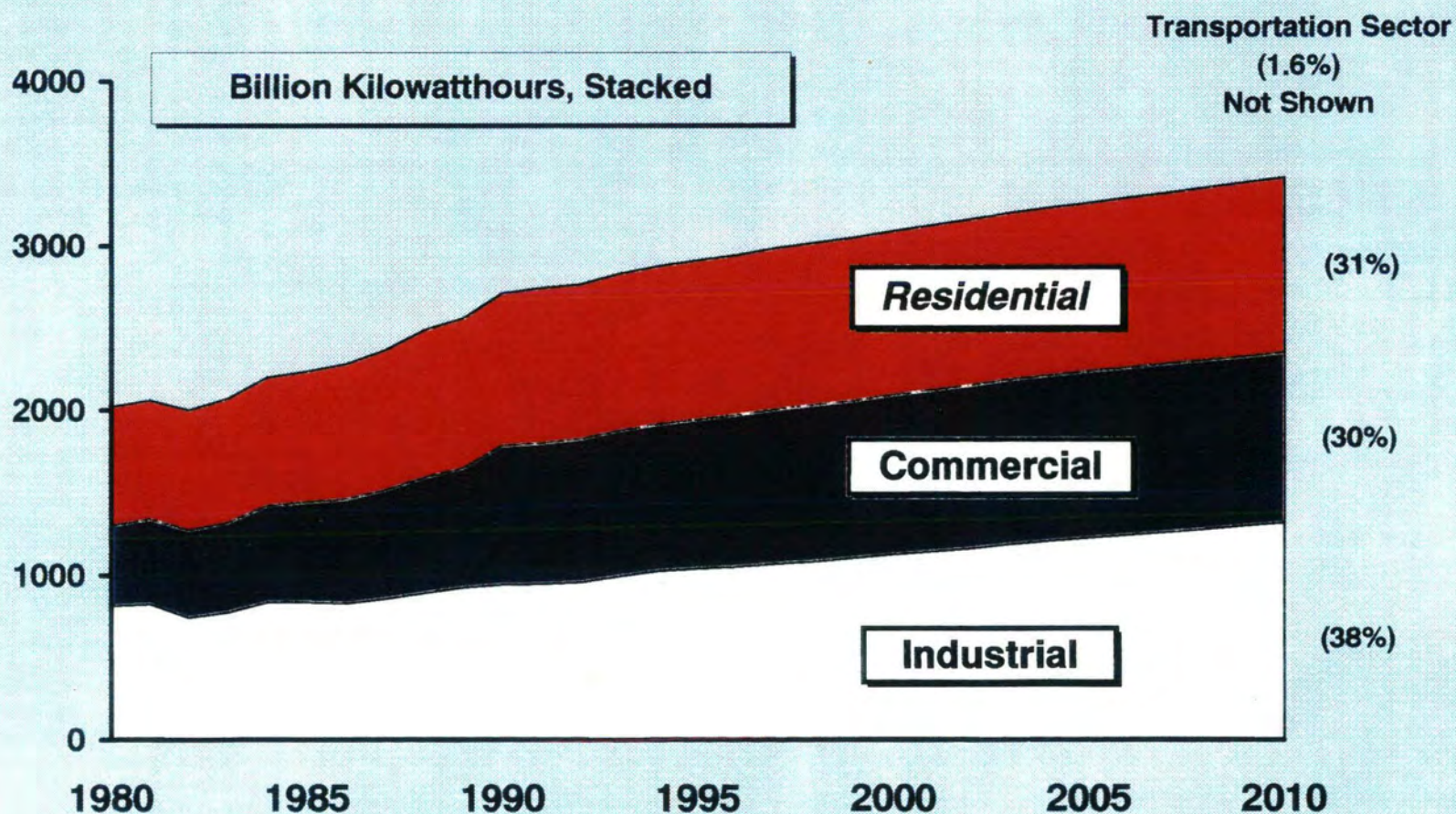


## Electricity Sales 1970 - 2010





## Electricity Sales 1980 - 2010



OIAF/01/94 Note: (\*.\*) indicates percentage of total sales in year 2010

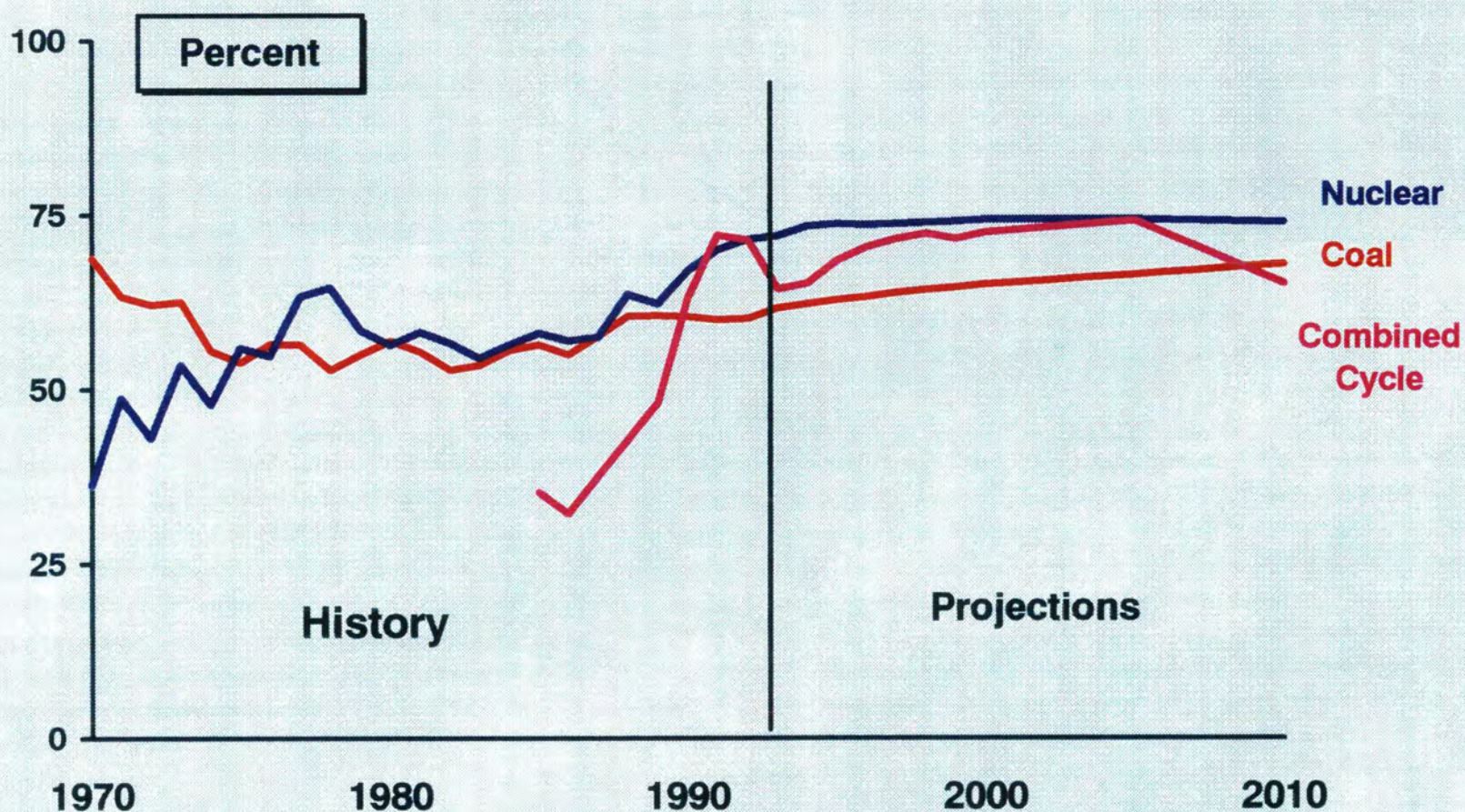


## **Meeting the Demand for Electricity**

- **Increased Utilization of Existing Plants**
- **Extending the Lives of Existing Plants**
- **Electricity Imports**
- **Growing Reliance on Nonutility Generators**
- **Demand-Side Management**
- **Constructing New Plants**



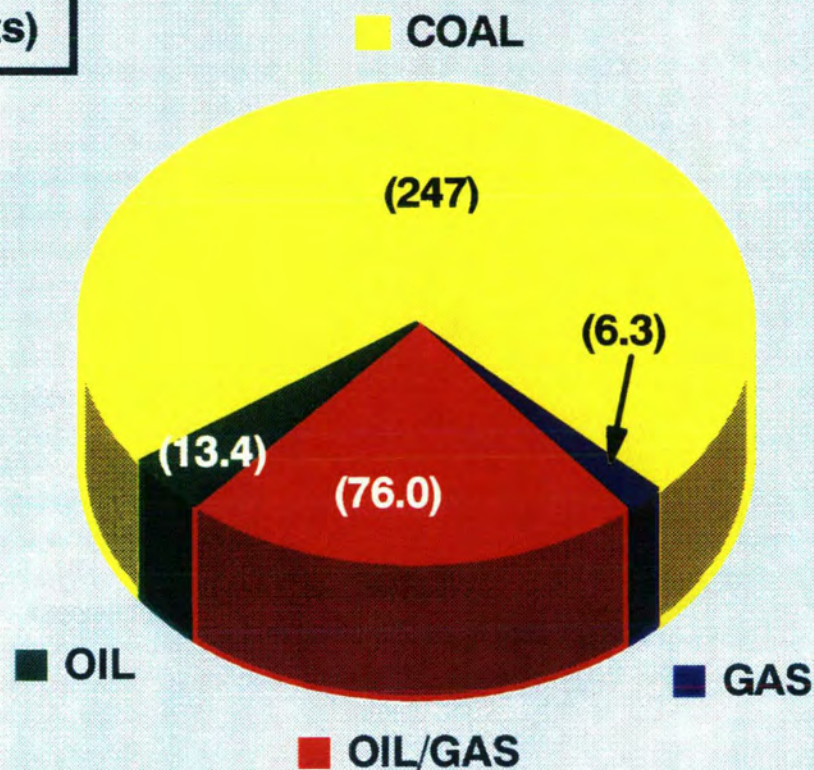
## Utilization of Utility Power Plants 1970 - 2010





## Life Extension Assumed 1990 - 2010

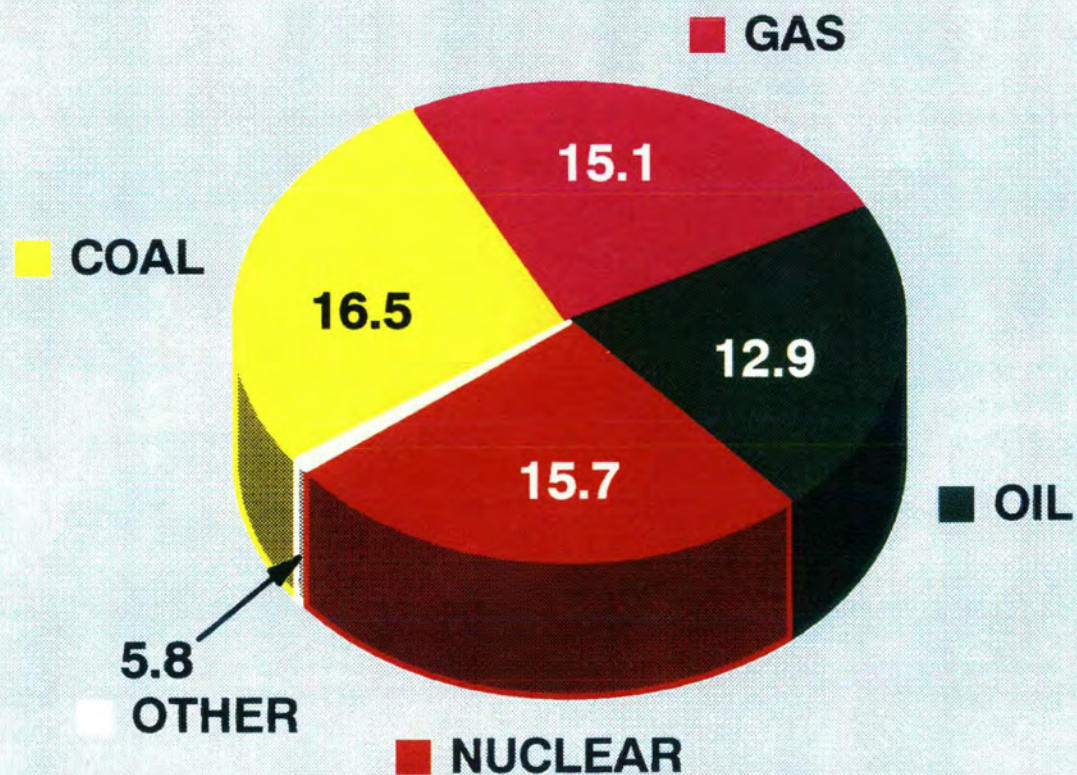
(Gigawatts)





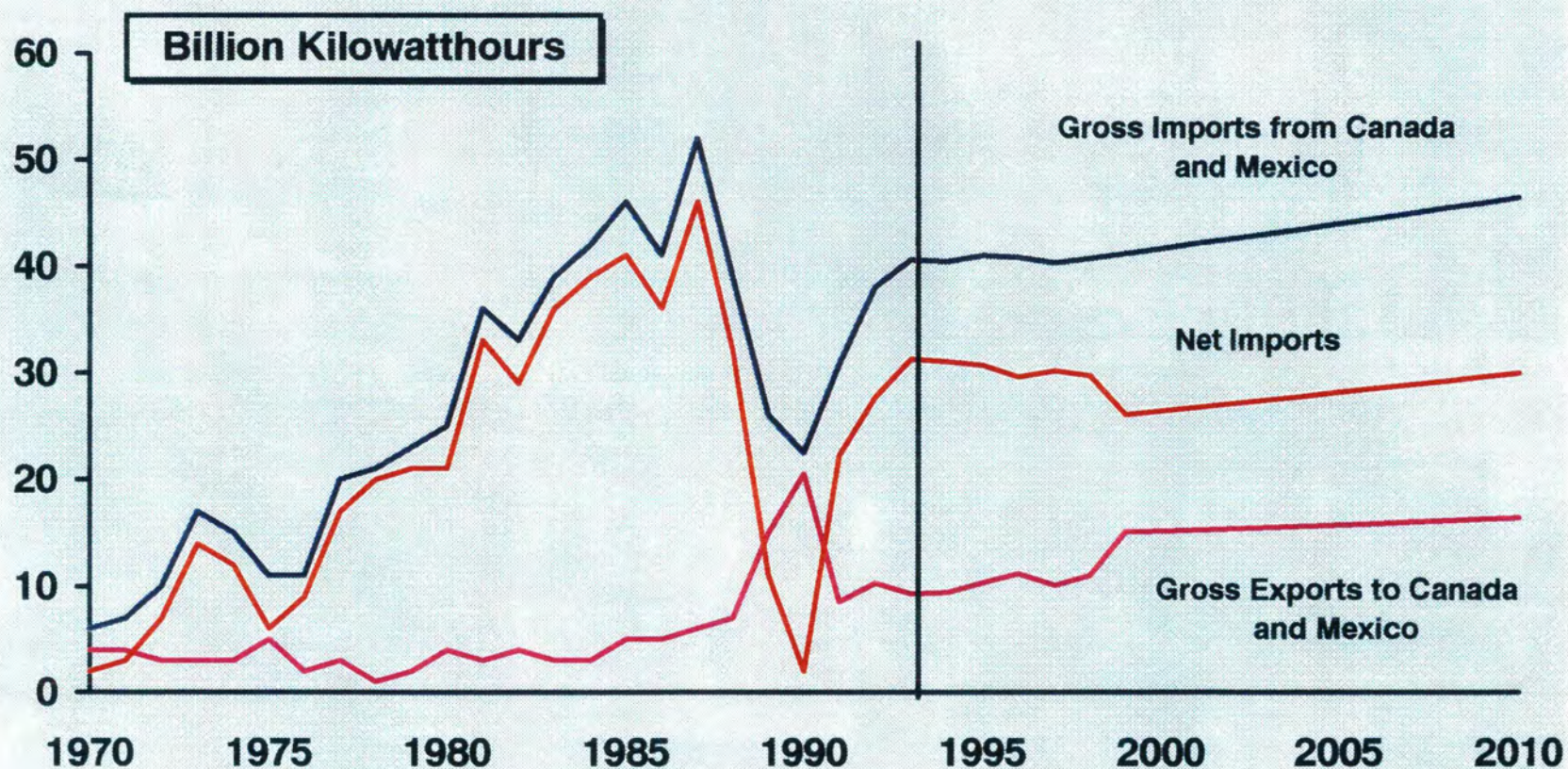
## RETIREMENTS 1990 - 2010

(Gigawatts)



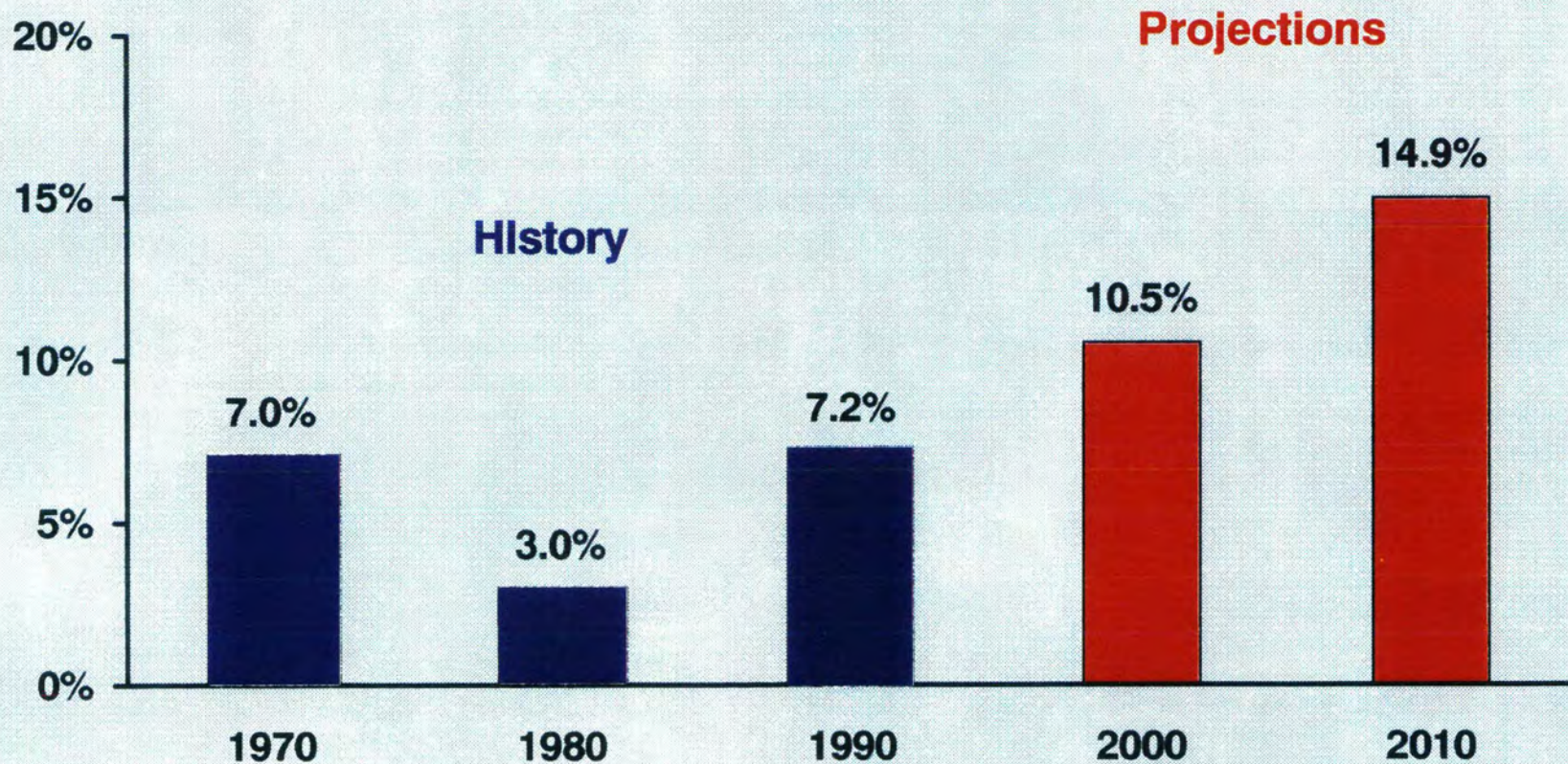


## Electricity Trade with Canada and Mexico 1970 - 2010



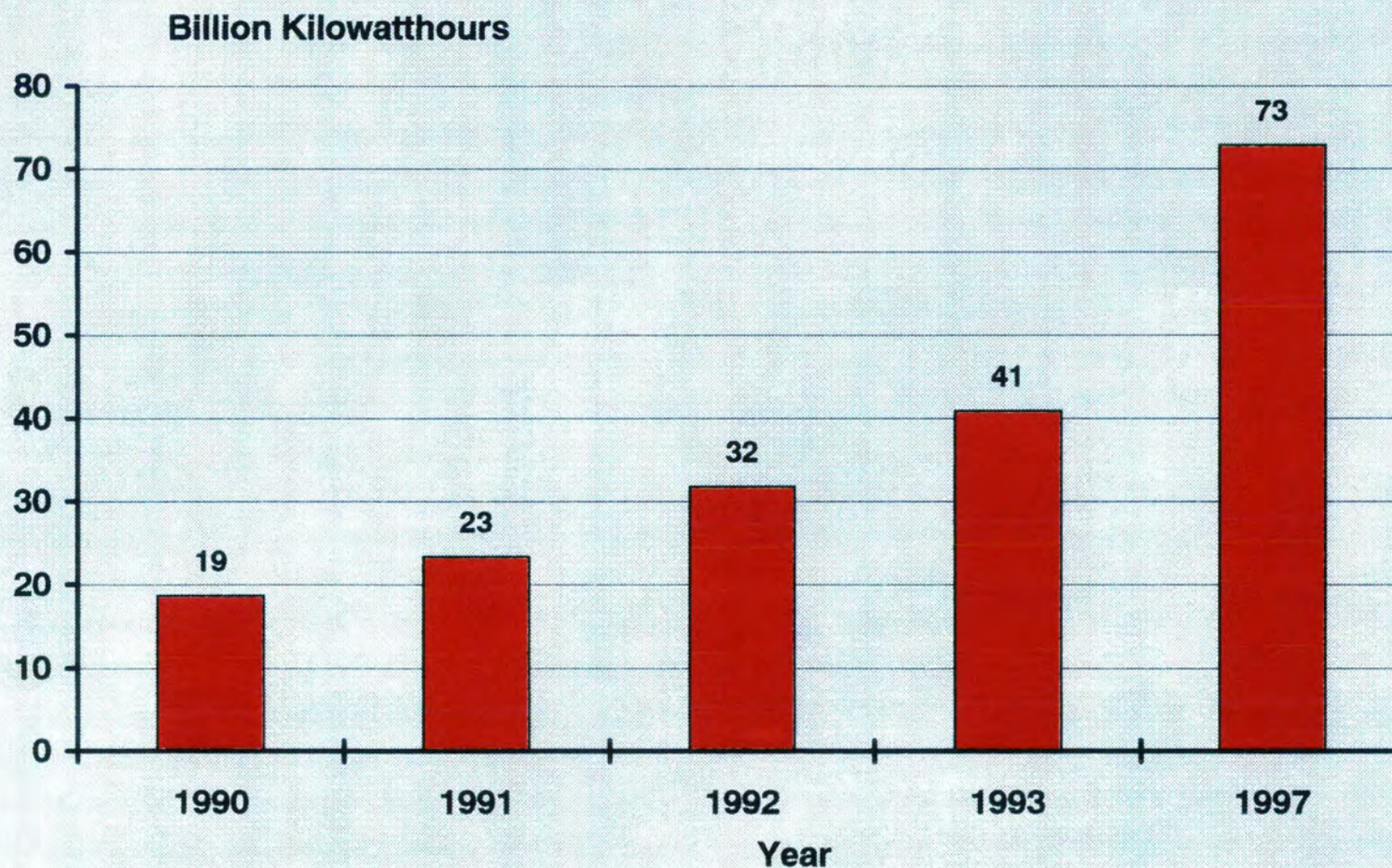


**NONUTILITY SHARE OF TOTAL U.S. GENERATION**



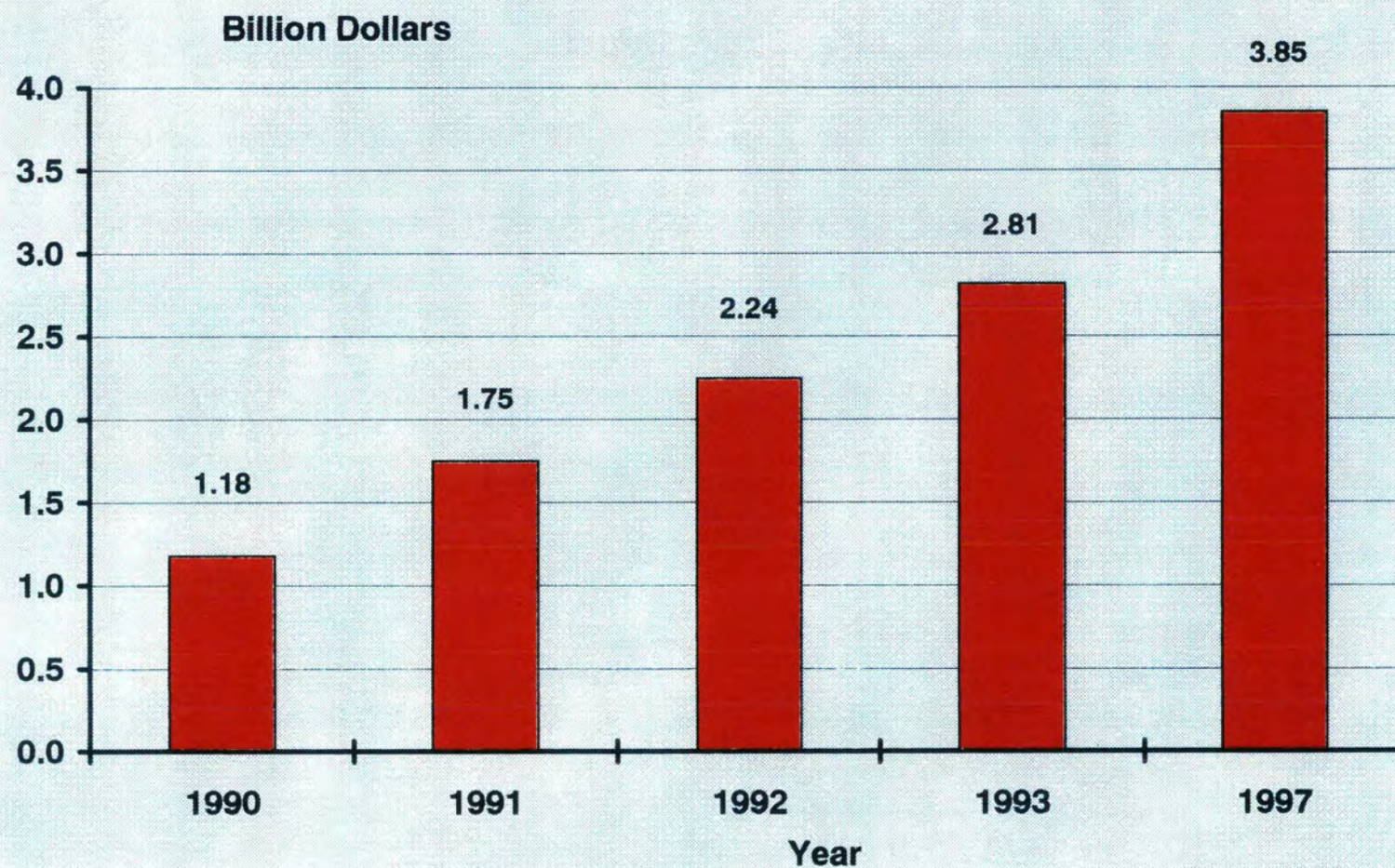


## DSM Energy Savings



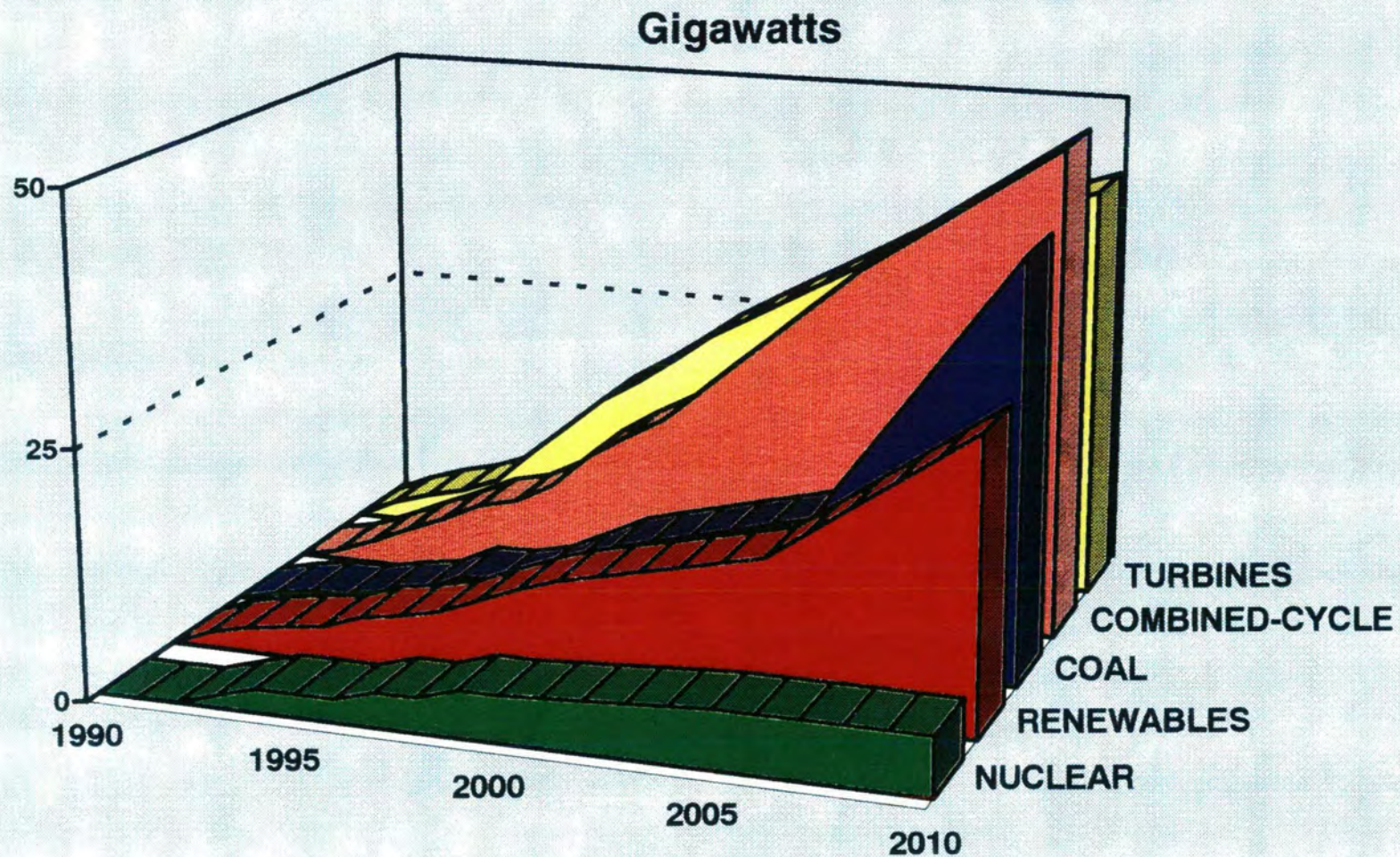


## DSM Expenditures



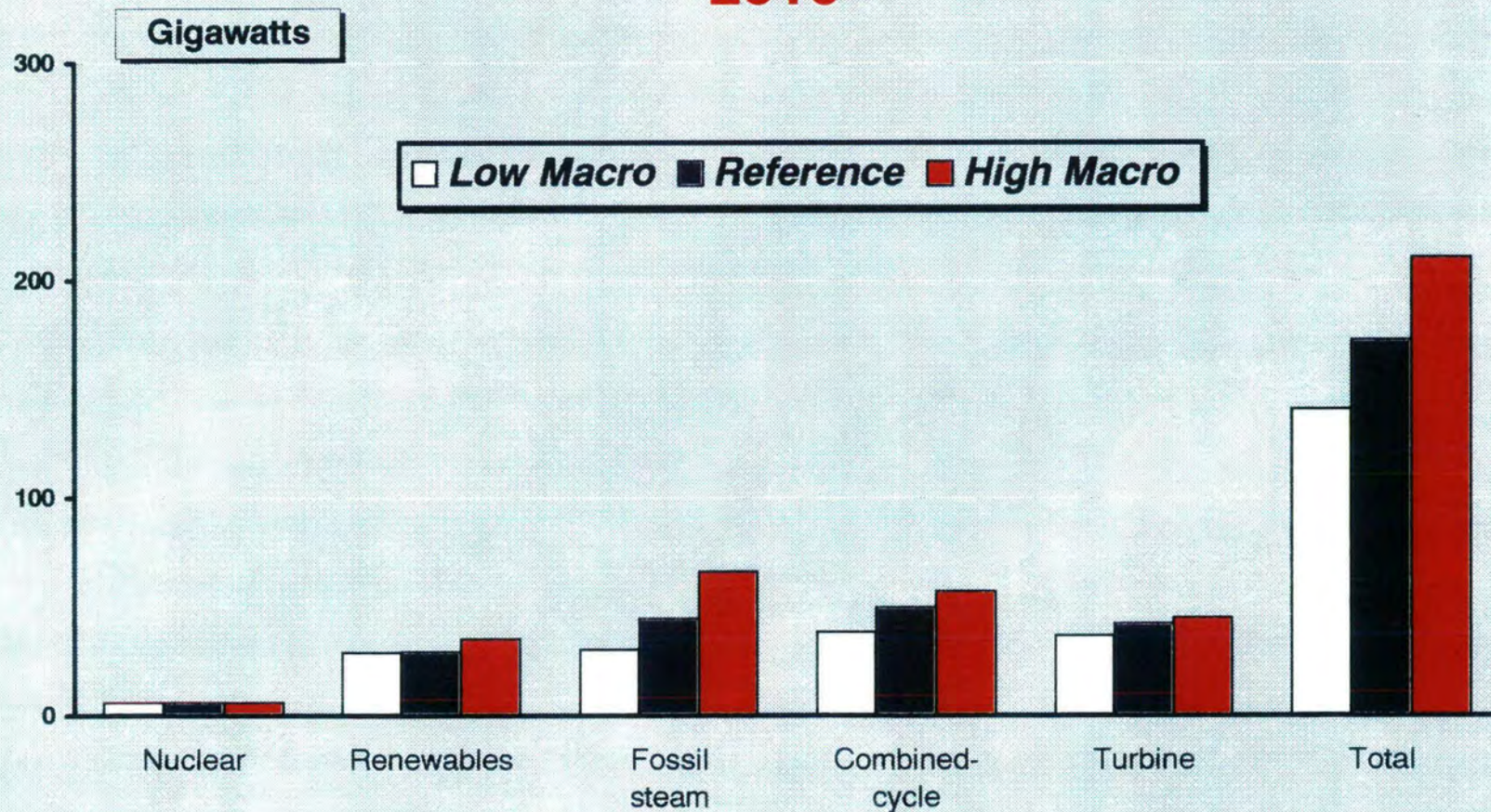


## Cumulative Additional Needed Capacity 1990 - 2010



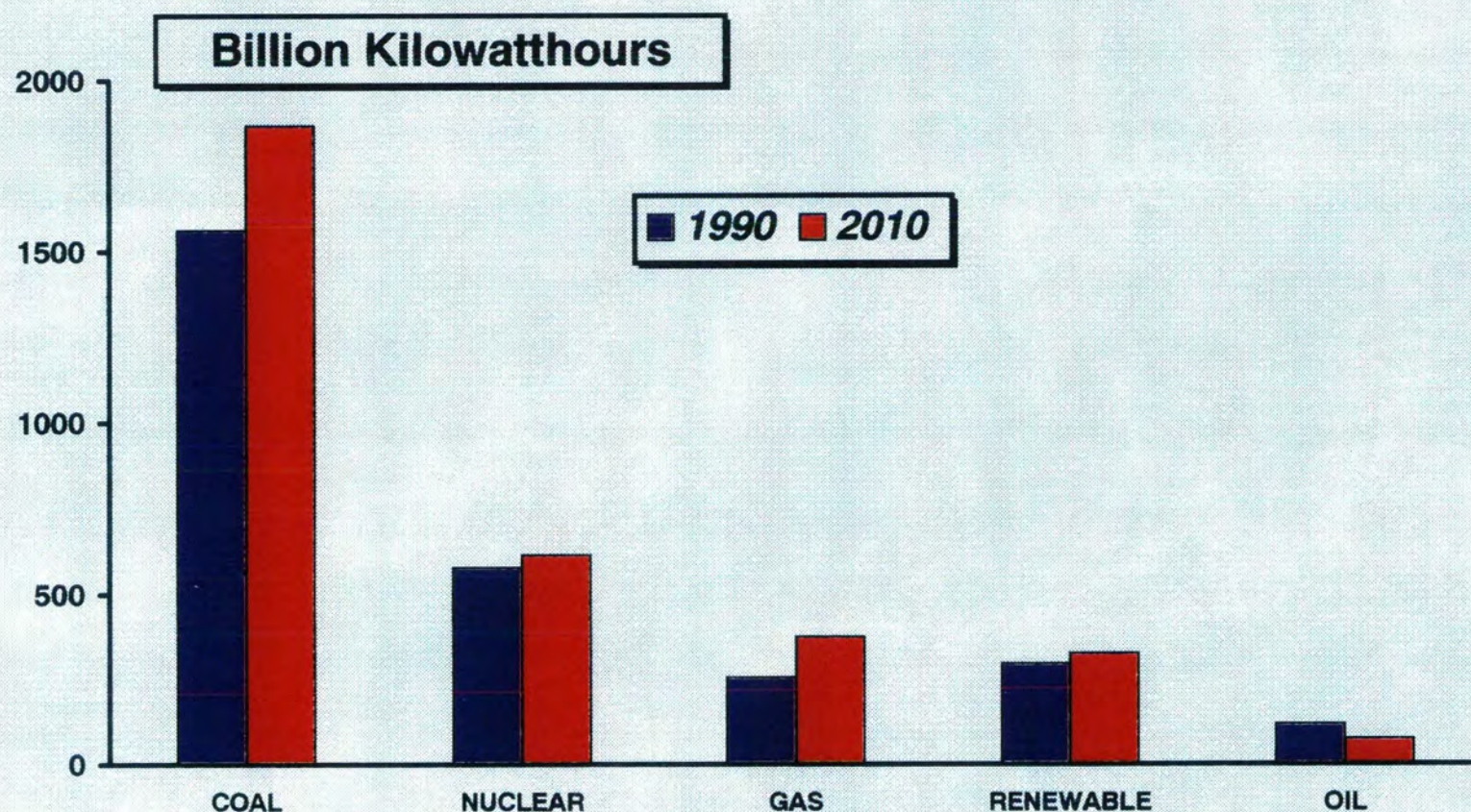


## Cumulative Additional Needed Capacity Low, Mid, High Macroeconomic Growth 2010



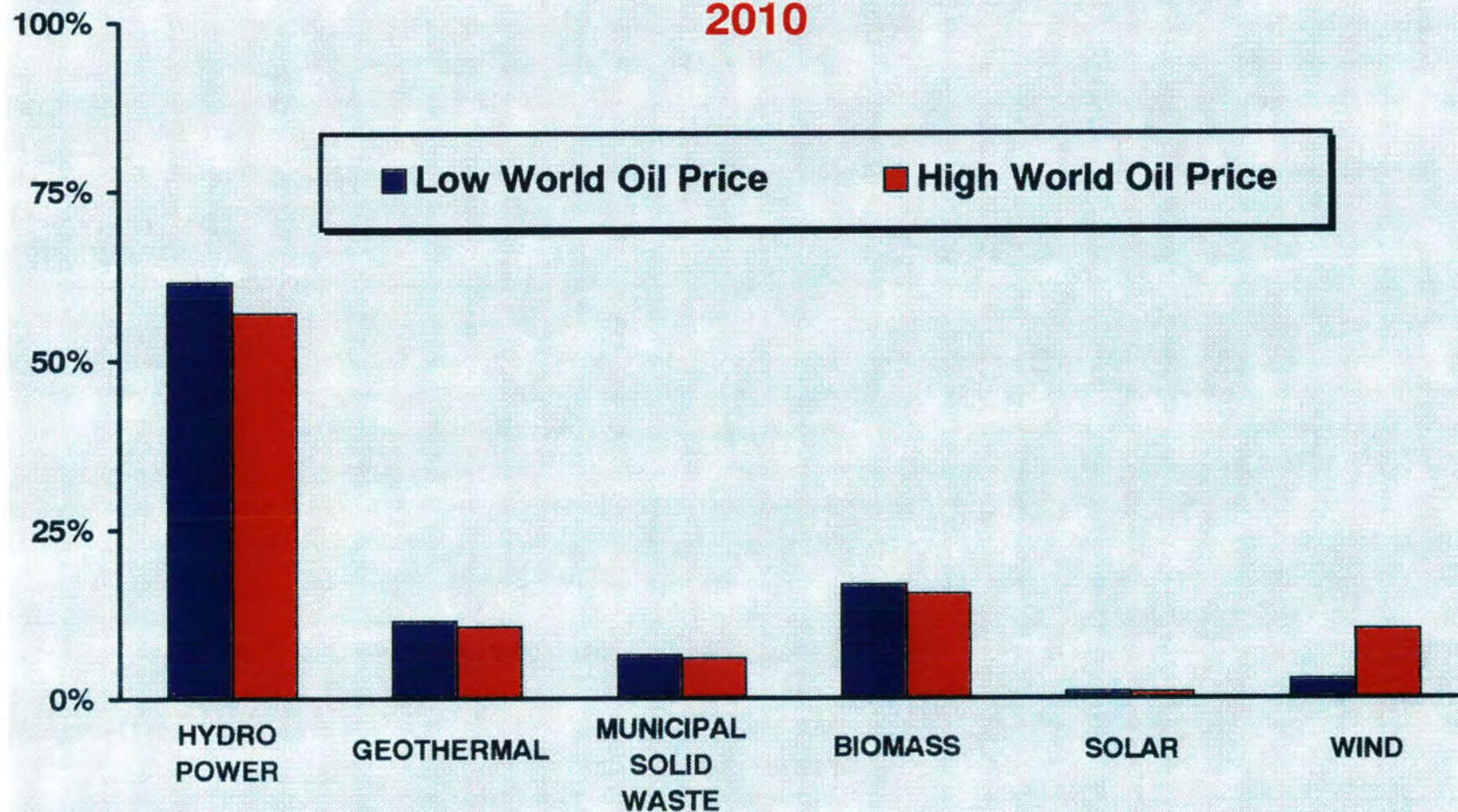


## Generation by Fuel Type 1990 and 2010



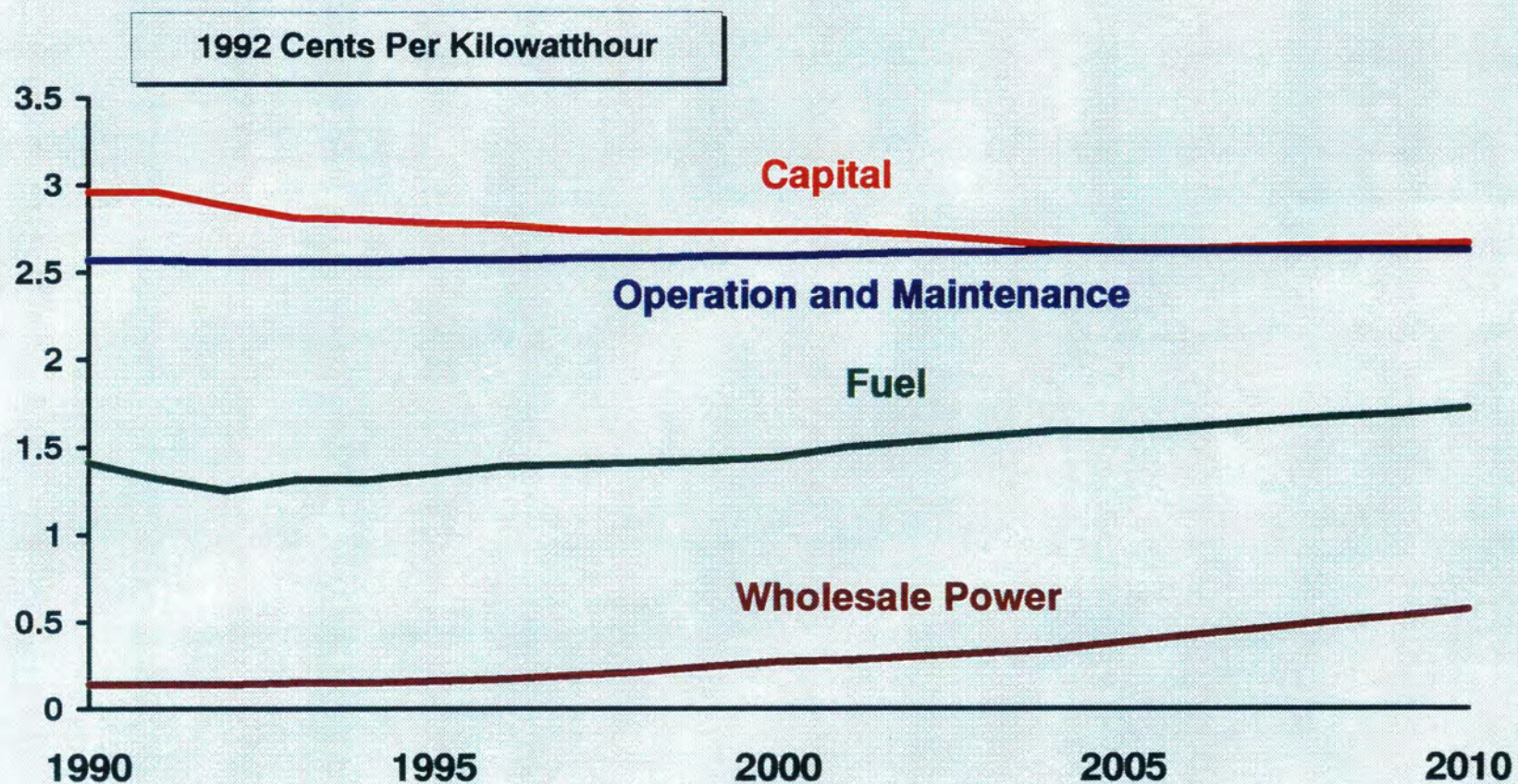


**Electricity Generation from Renewable Sources  
Share of Total Renewable Generation  
2010**



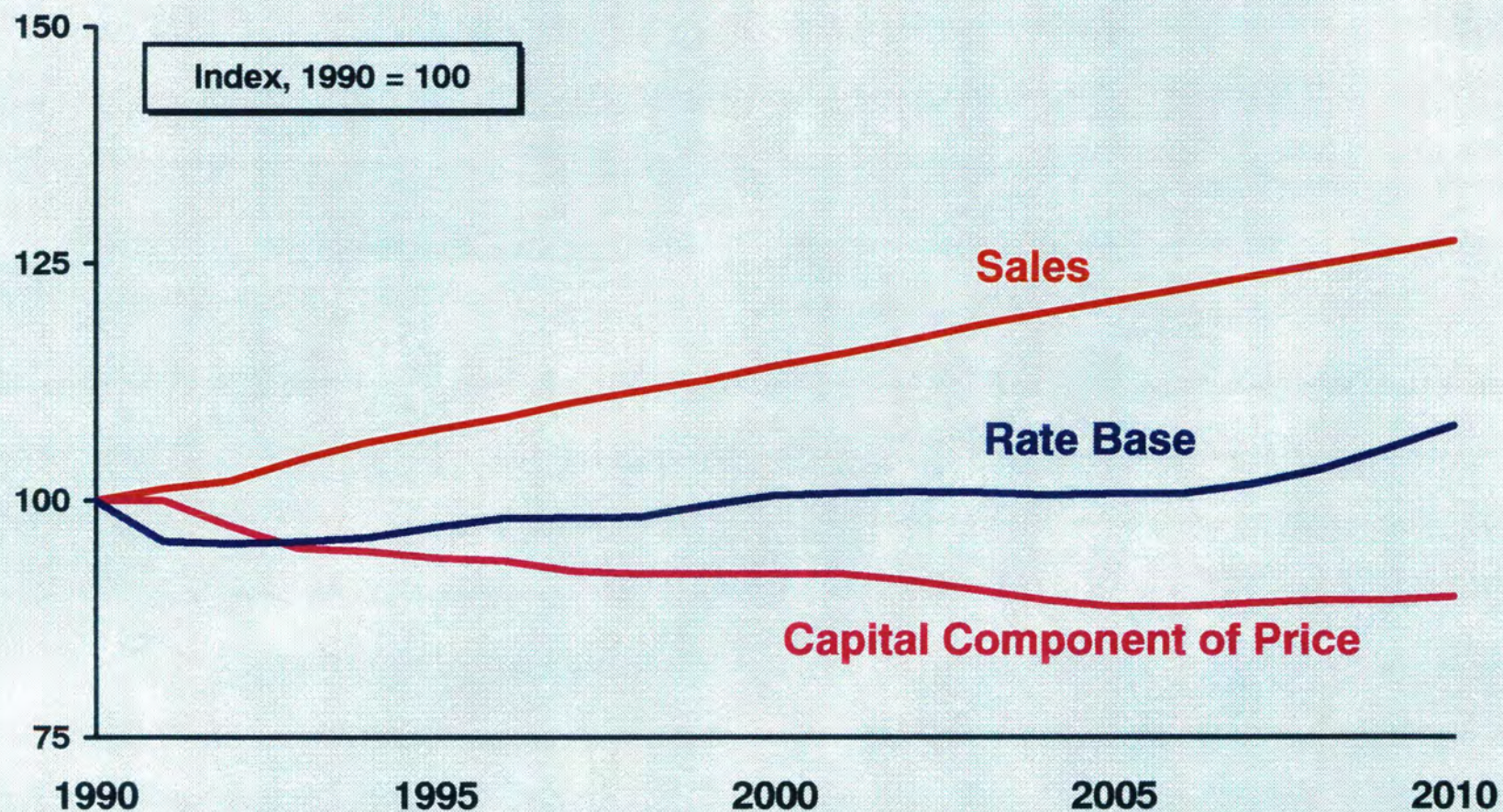


## Components of Electricity Price 1990 - 2010



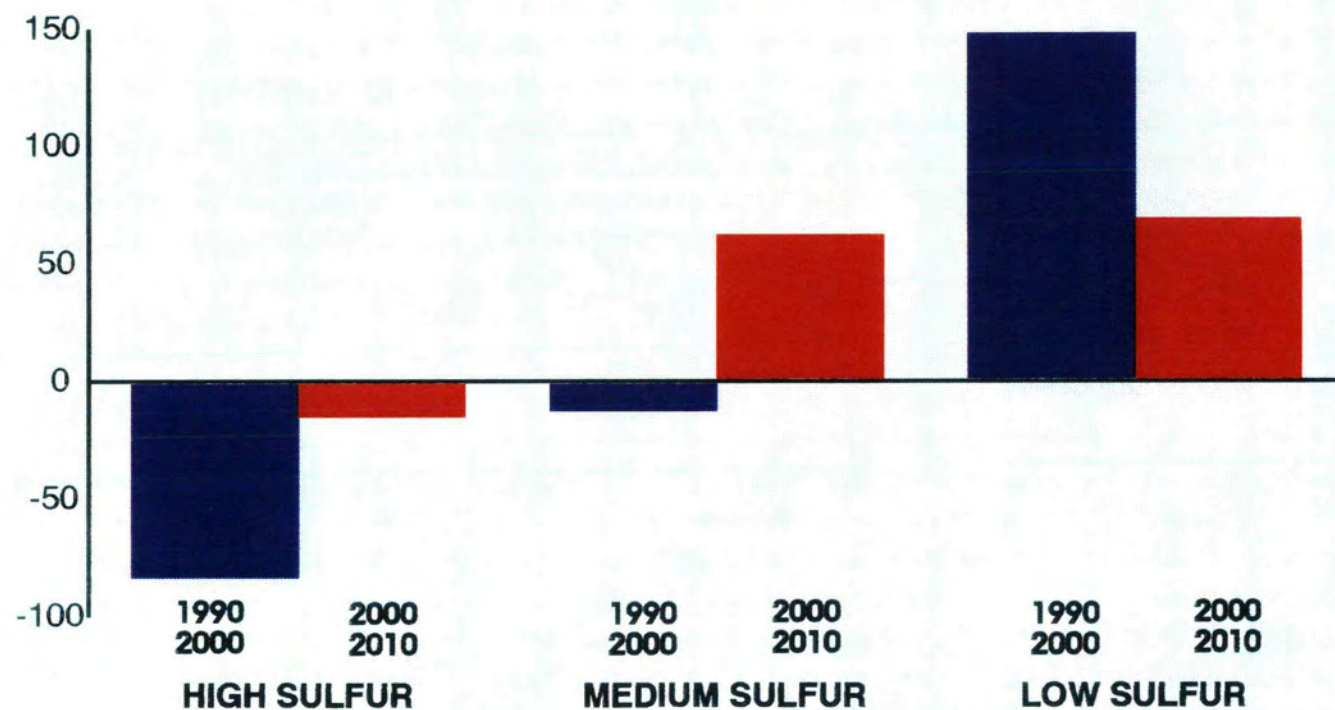


## Indices of Capital Cost Factors 1990 - 2010



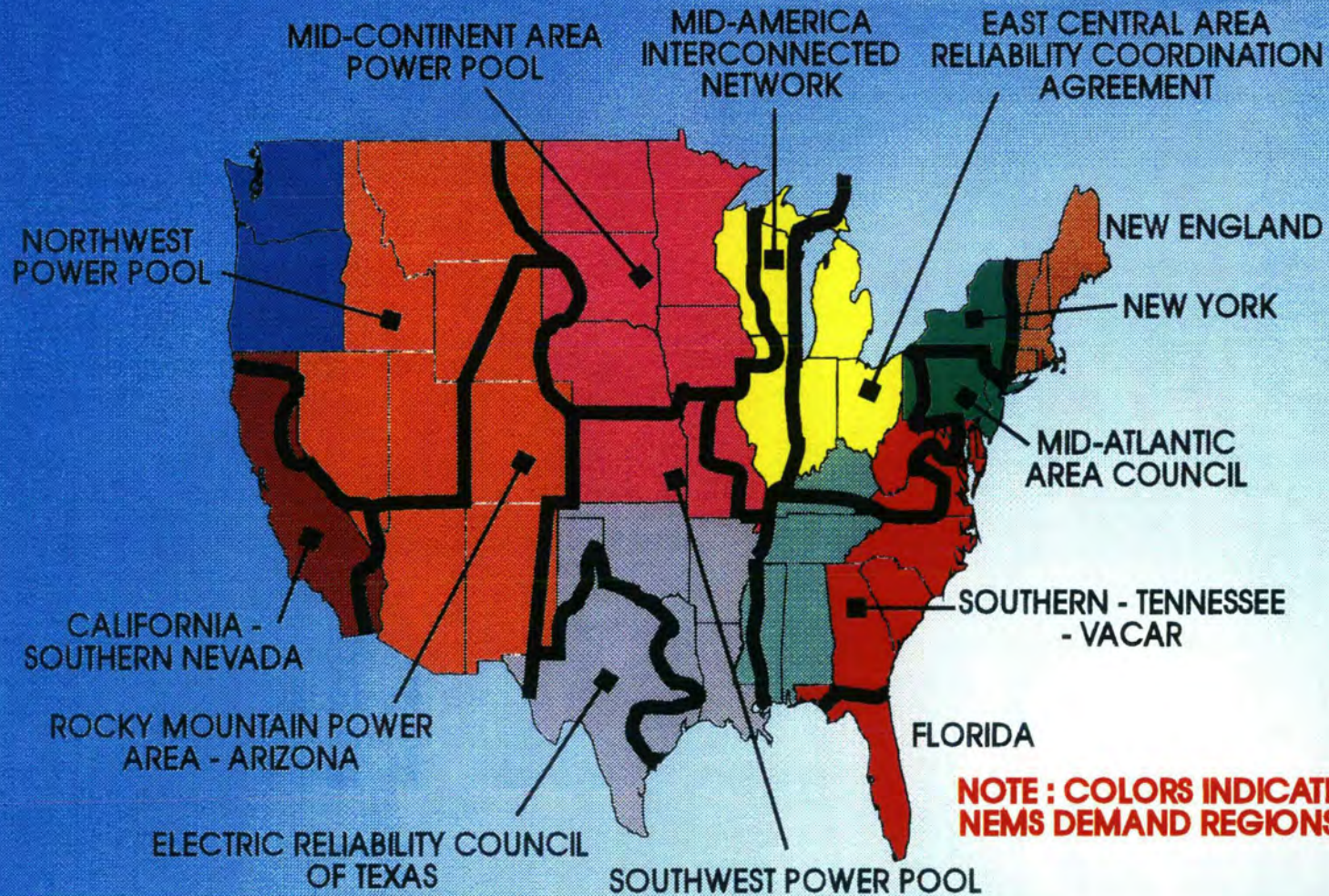


**Change in coal consumption by sulfur content, 1990-2010**  
(million short tons)





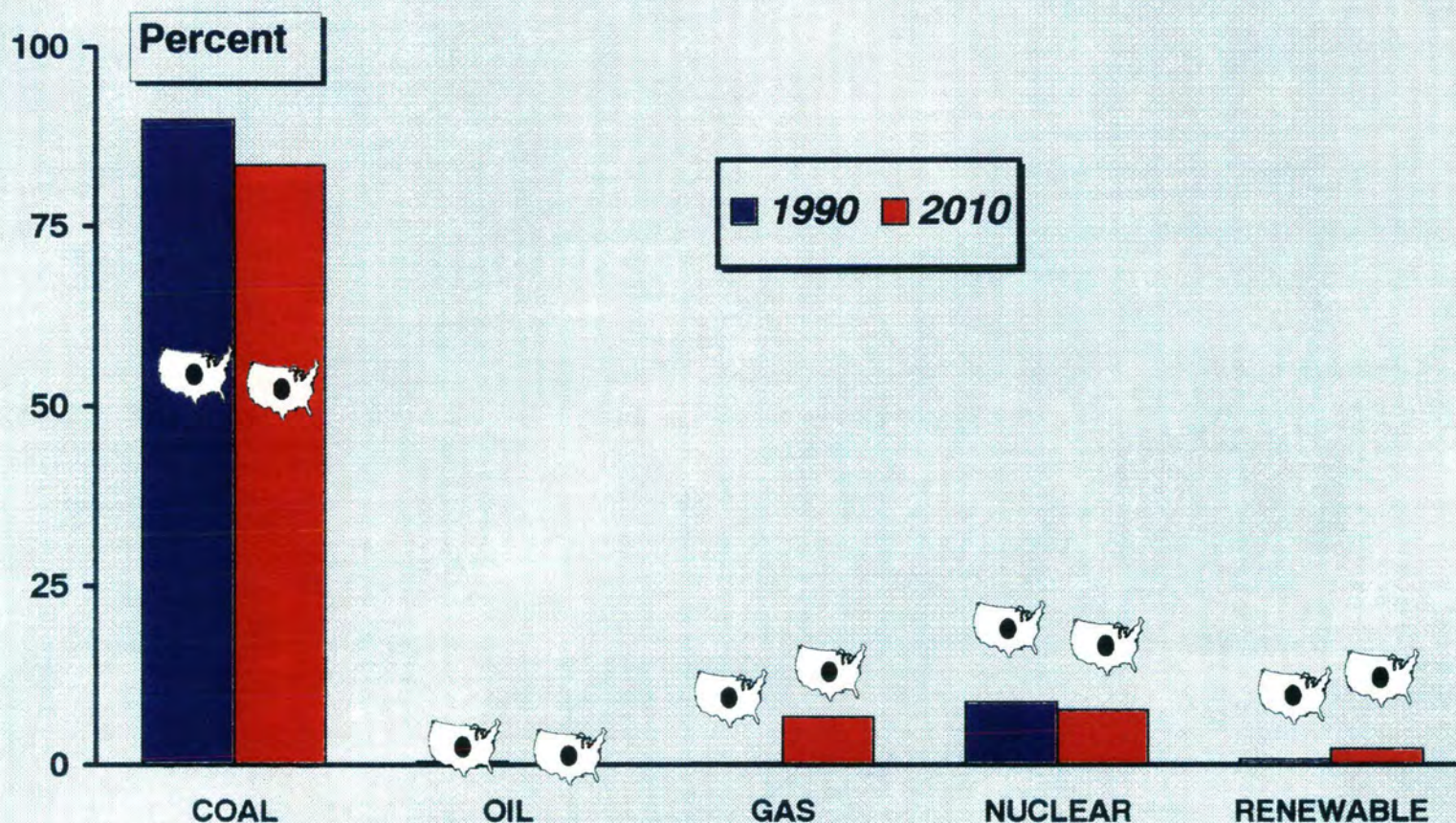
## EMM SUPPLY REGIONS





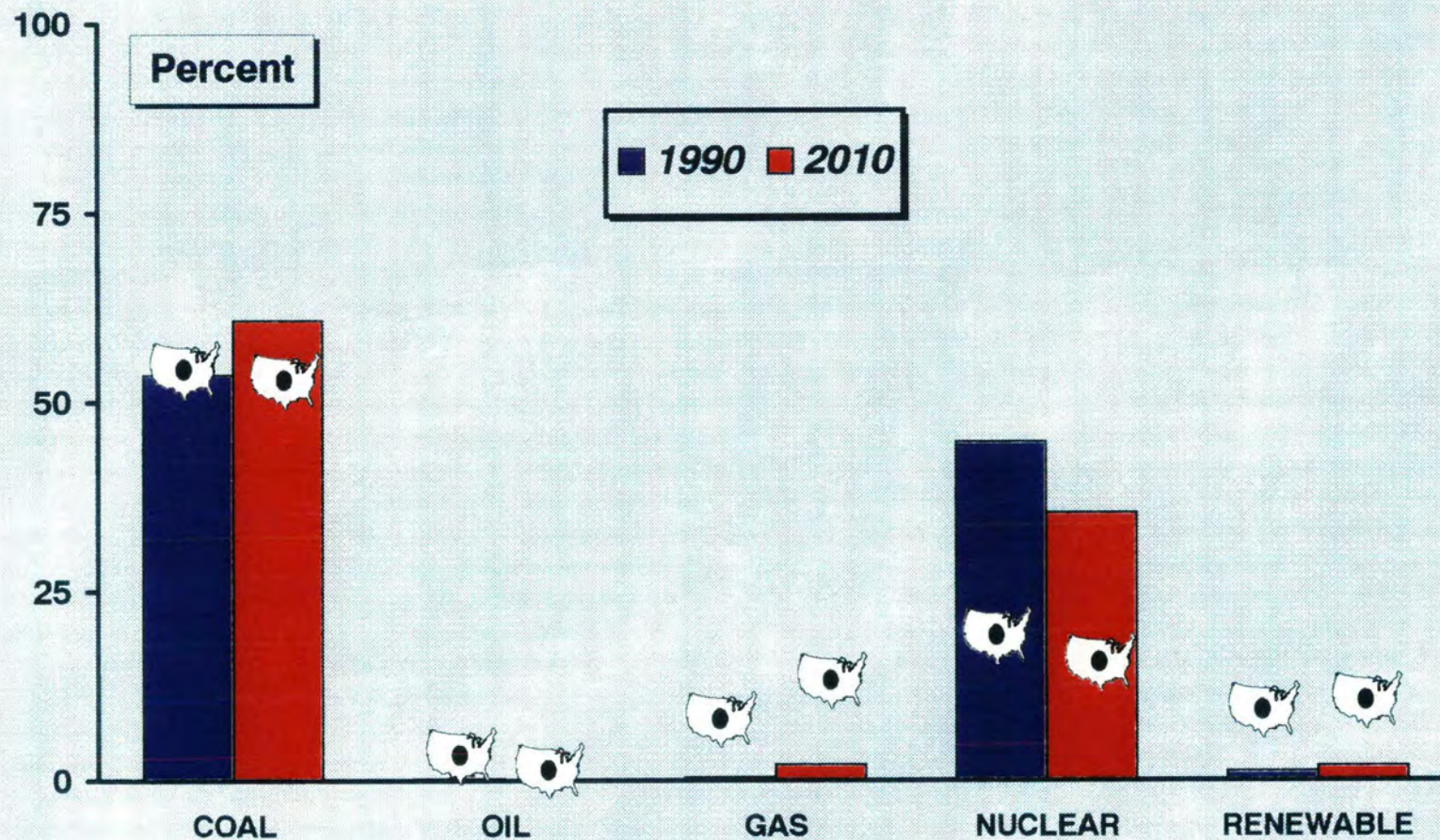
## Generation Share By Fuel, 1990 and 2010

### East Central Area Reliability Coordination Agreement



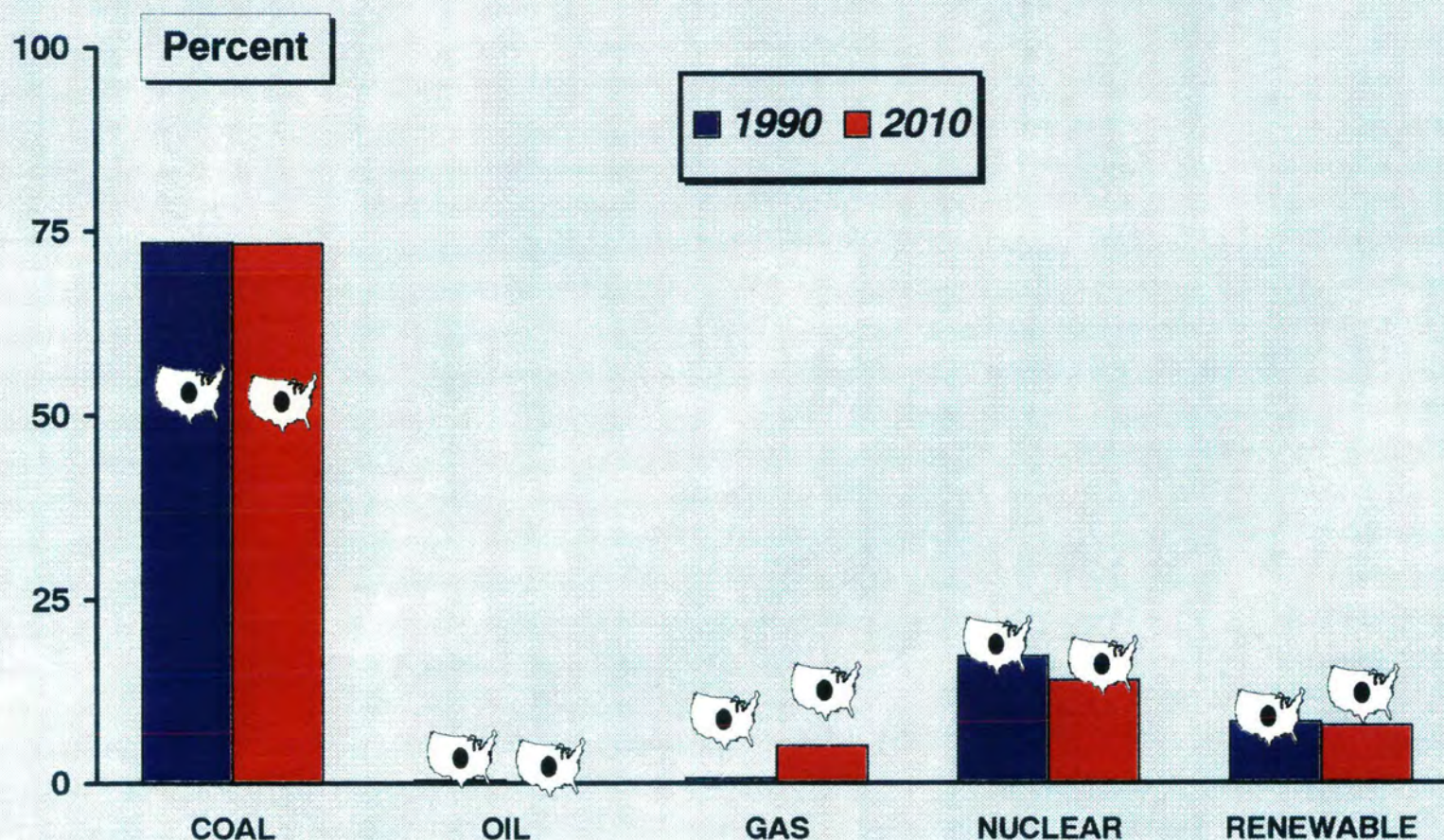


## Generation Share By Fuel, 1990 and 2010 Mid-America Interconnected Network



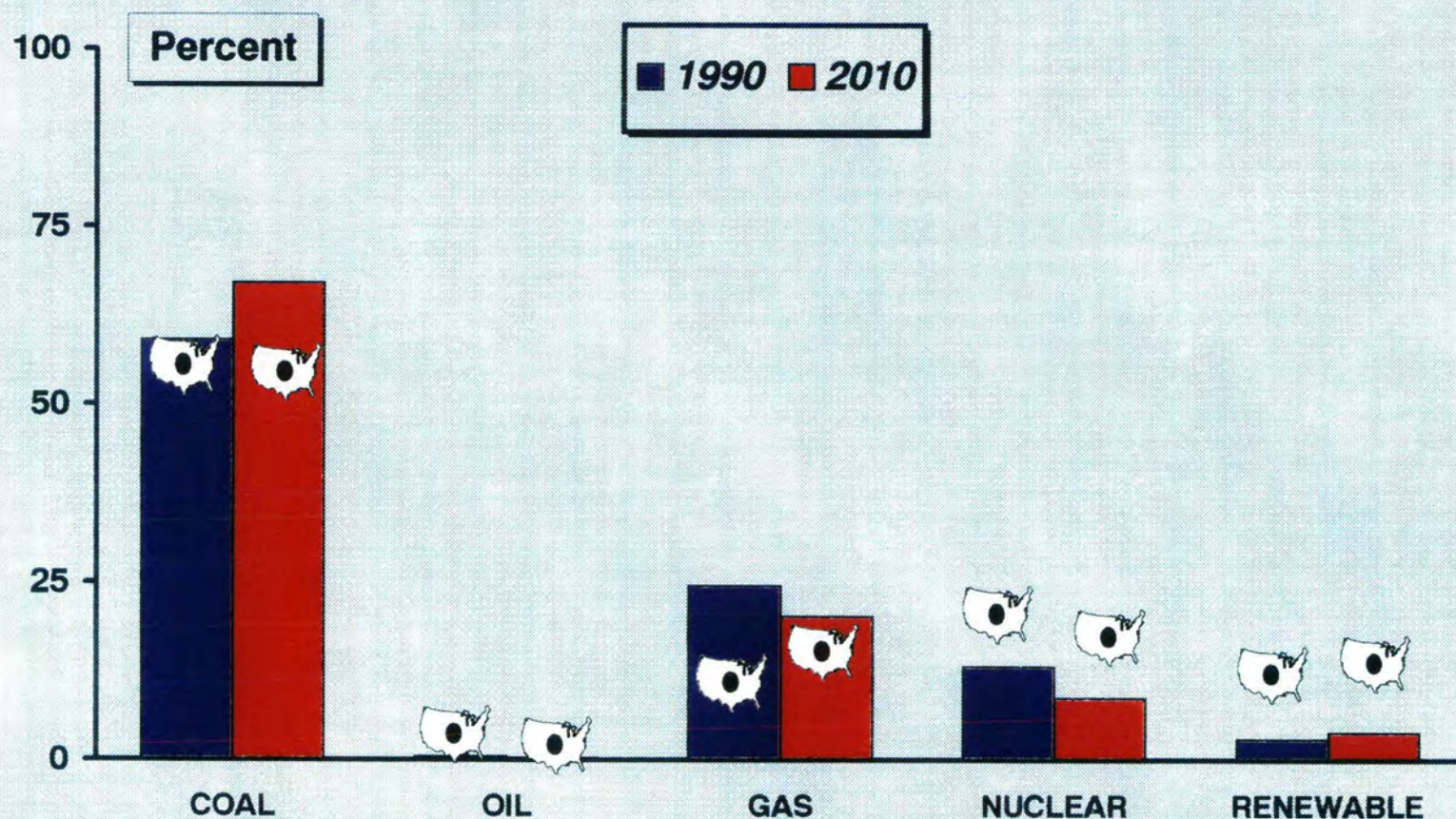


## Generation Share By Fuel, 1990 and 2010 Mid-Continent Area Power Pool



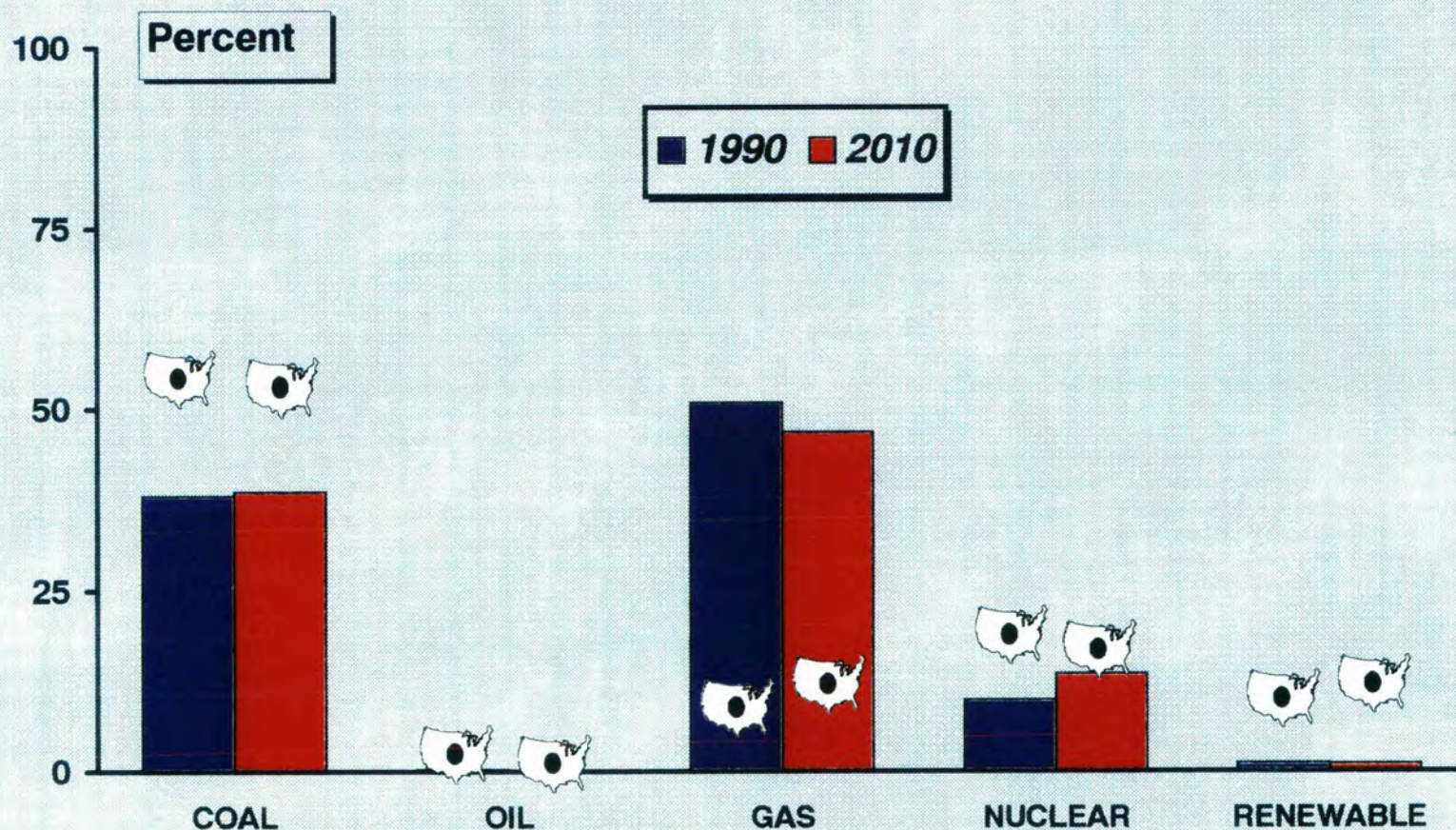


## Generation Share By Fuel, 1990 and 2010 Southwest Power Pool



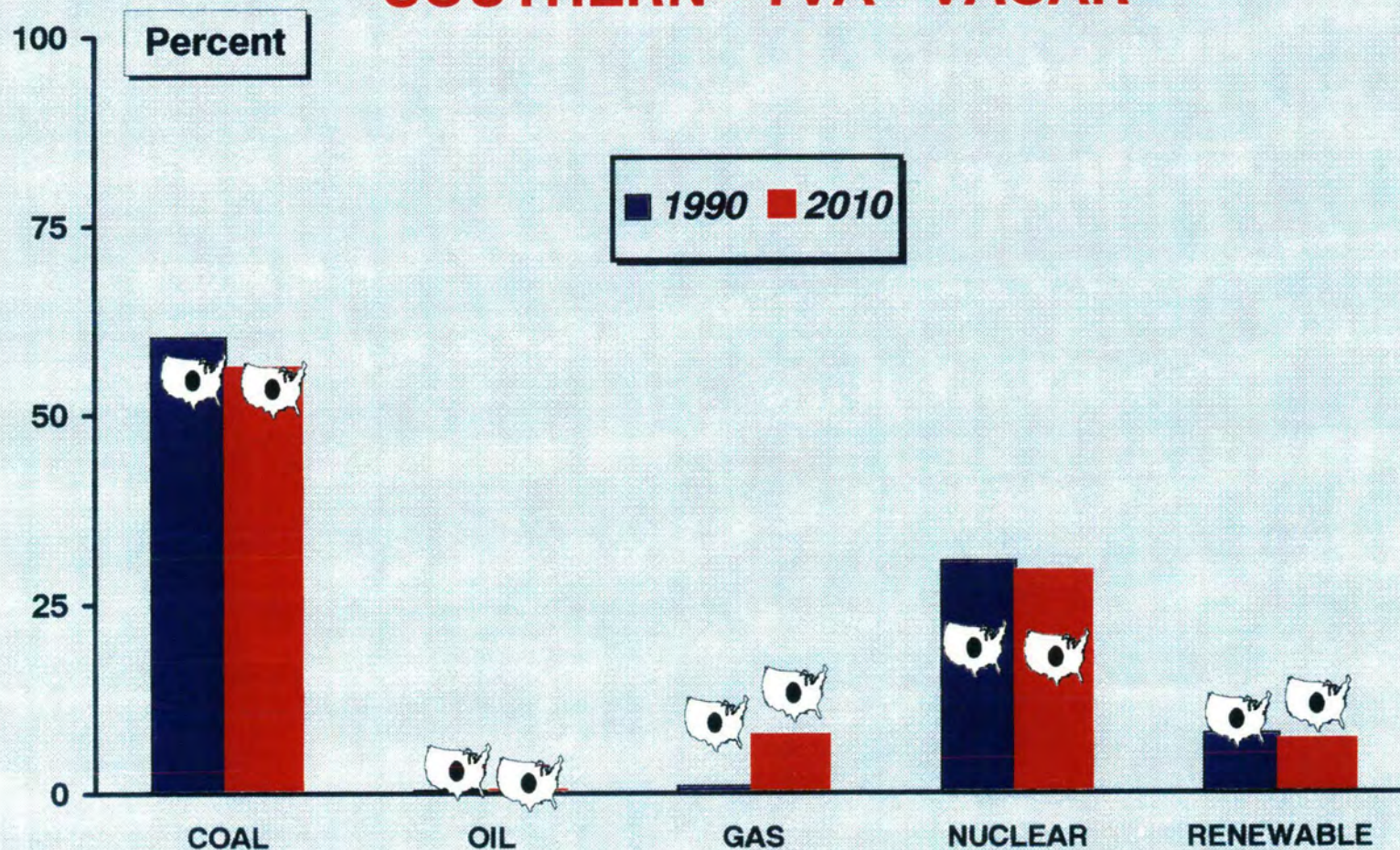


## Generation Share By Fuel, 1990 and 2010 Electric Reliability Council of Texas



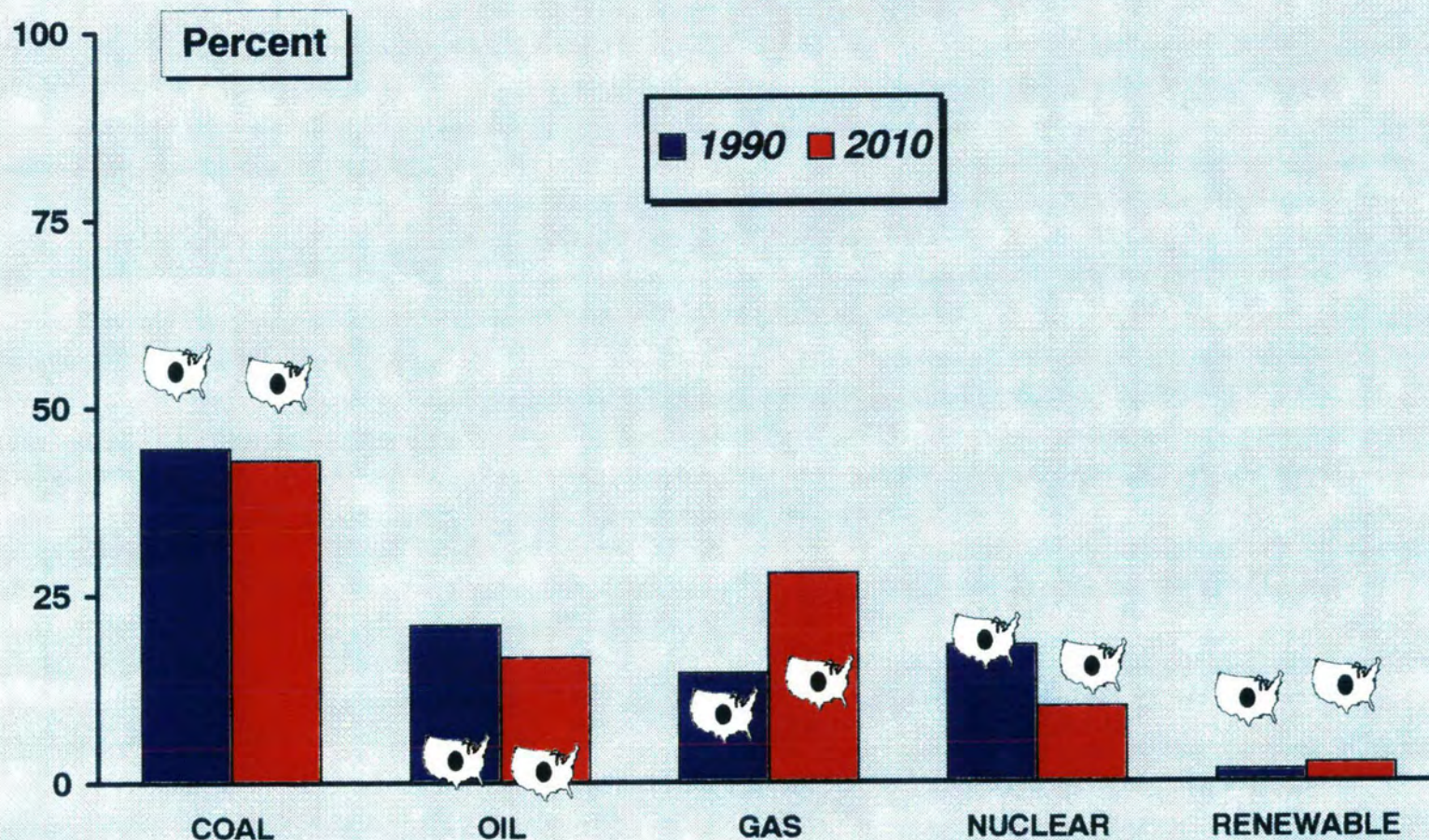


## Generation Share By Fuel, 1990 and 2010 SOUTHERN - TVA - VACAR



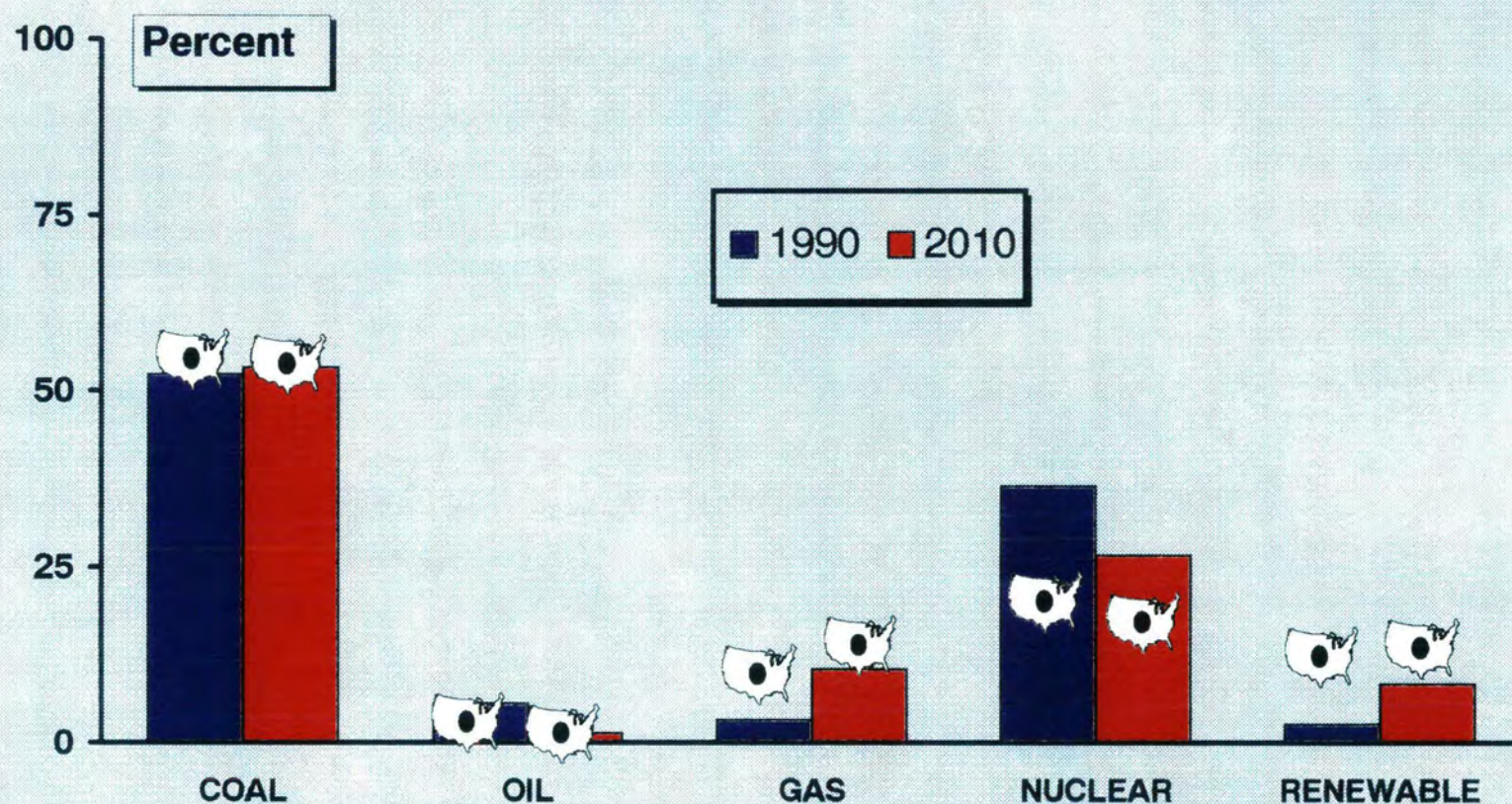


## Generation Share By Fuel, 1990 and 2010 Florida



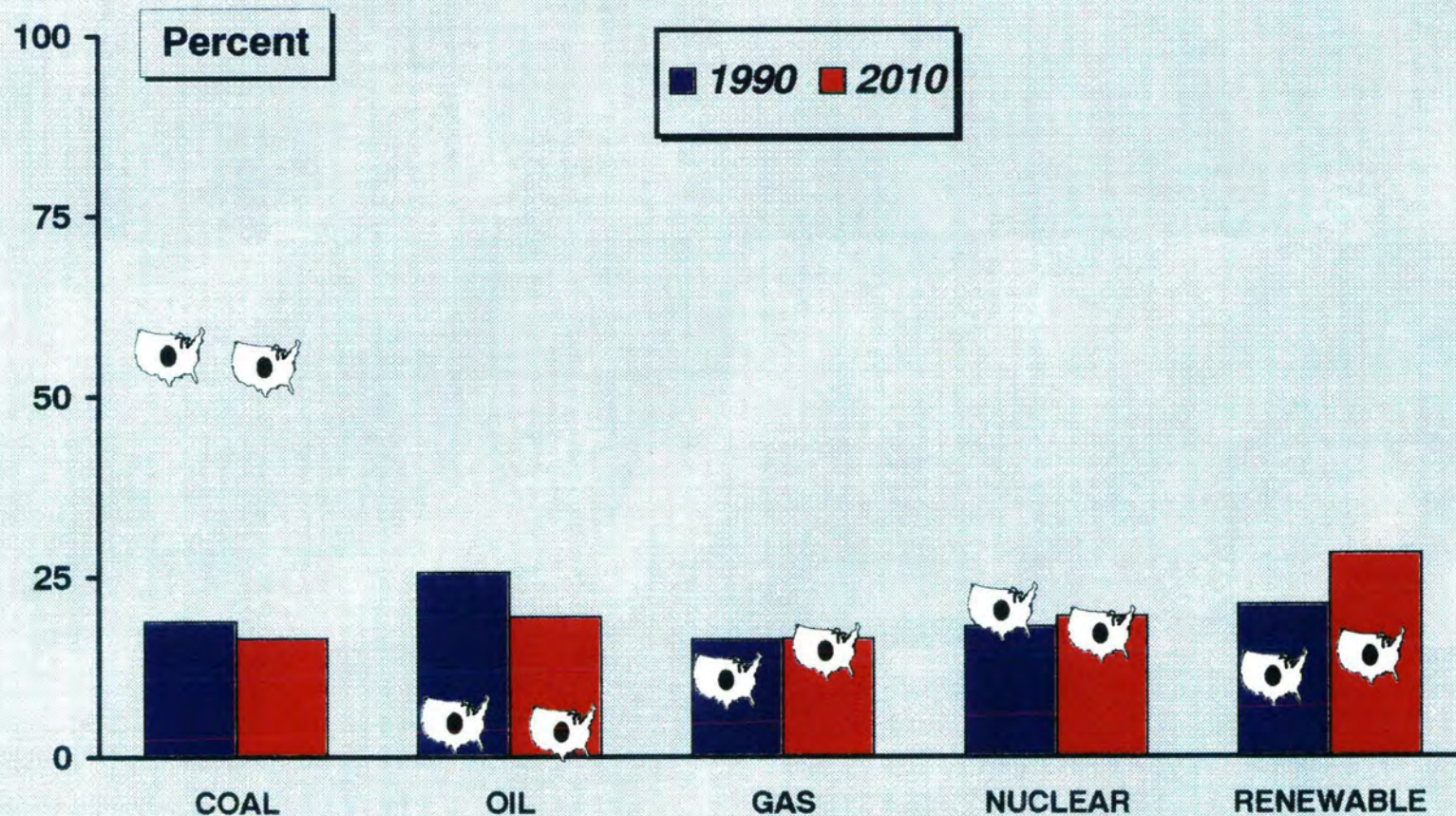


## Generation Share By Fuel, 1990 and 2010 Mid-Atlantic Area Council



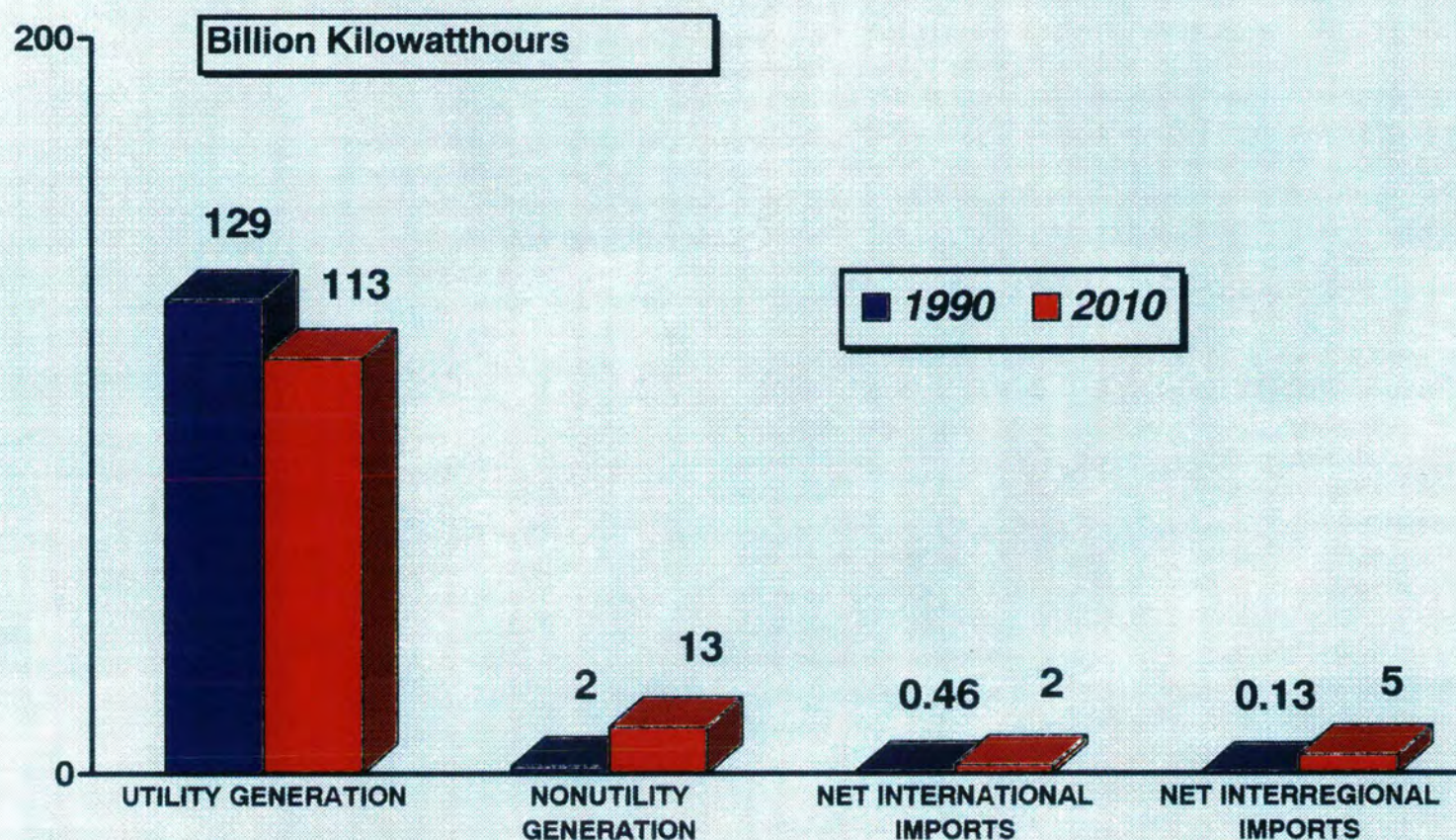


## Generation Share By Fuel, 1990 and 2010 New York



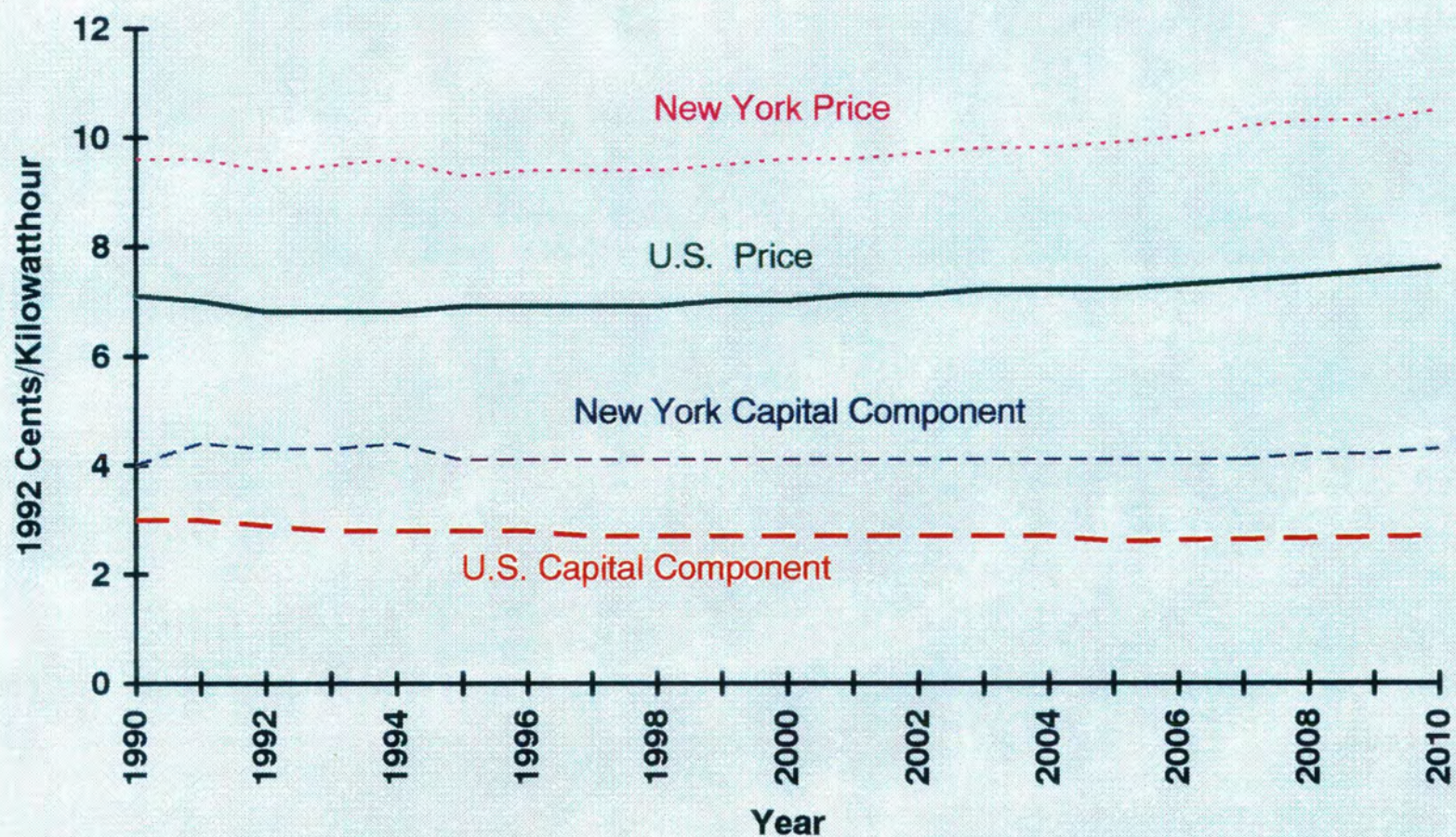


## Electricity Supply, 1990 and 2010 New York



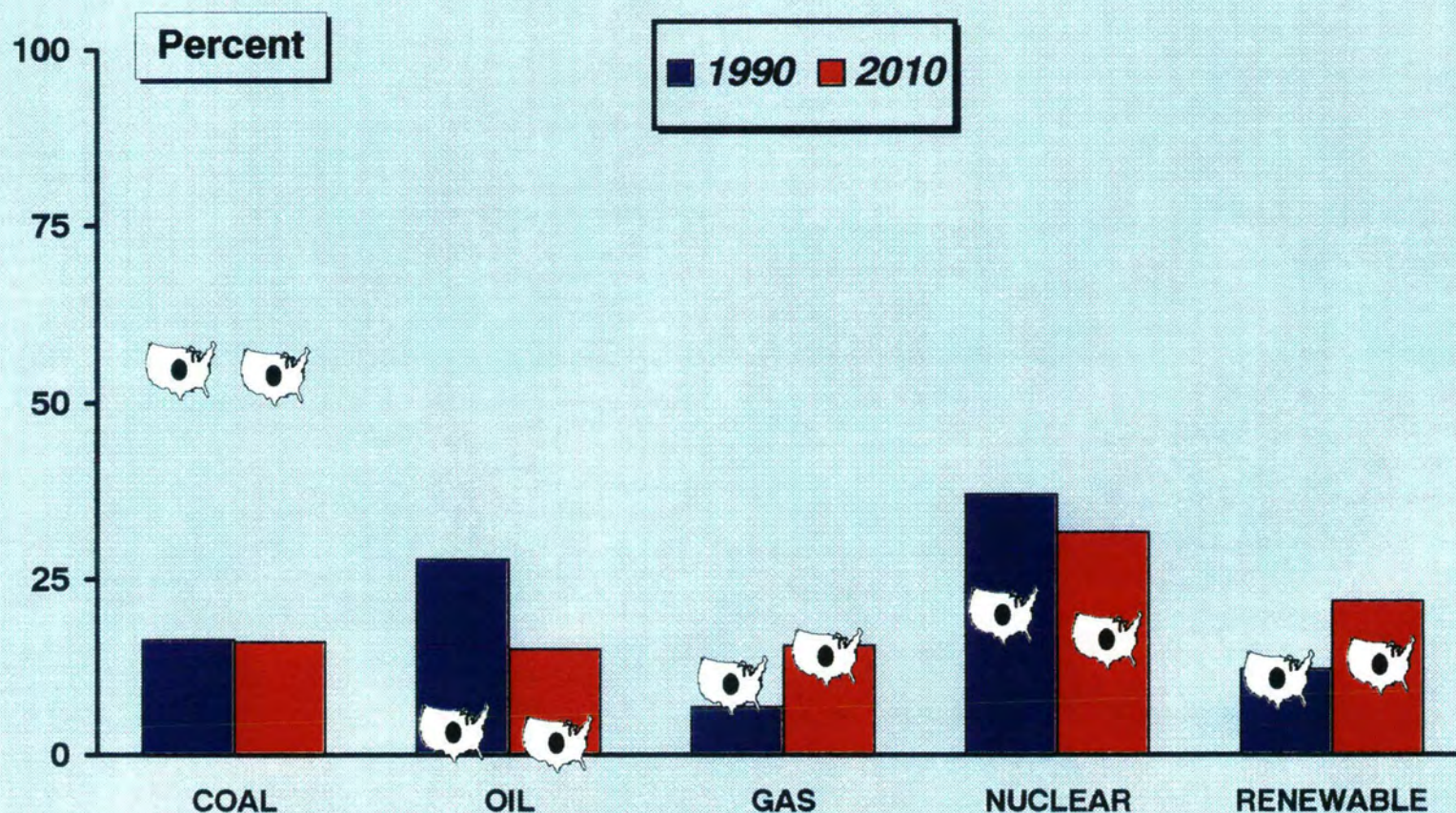


## New York Region Capital Component and Electricity Price



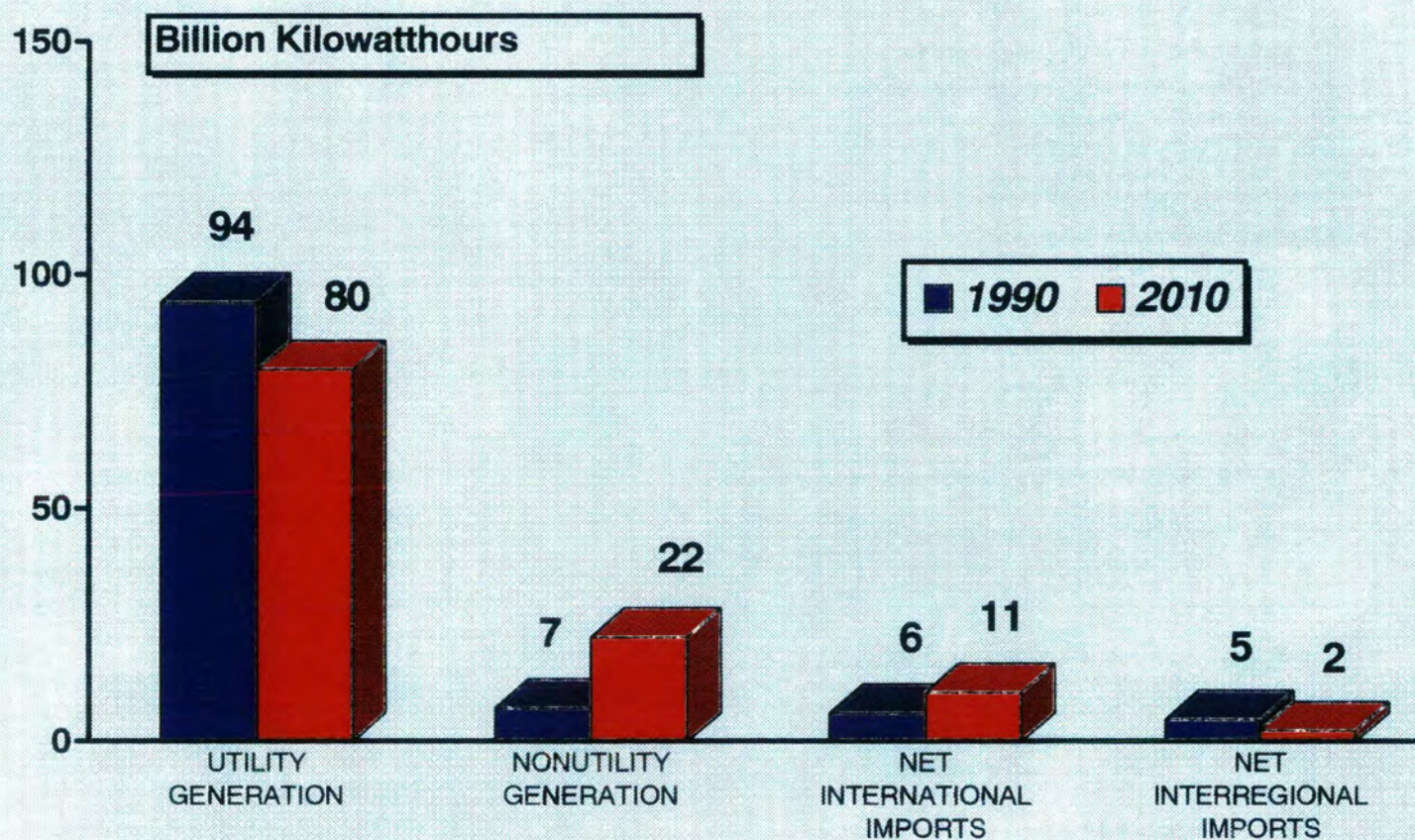


## Generation Share By Fuel, 1990 and 2010 New England



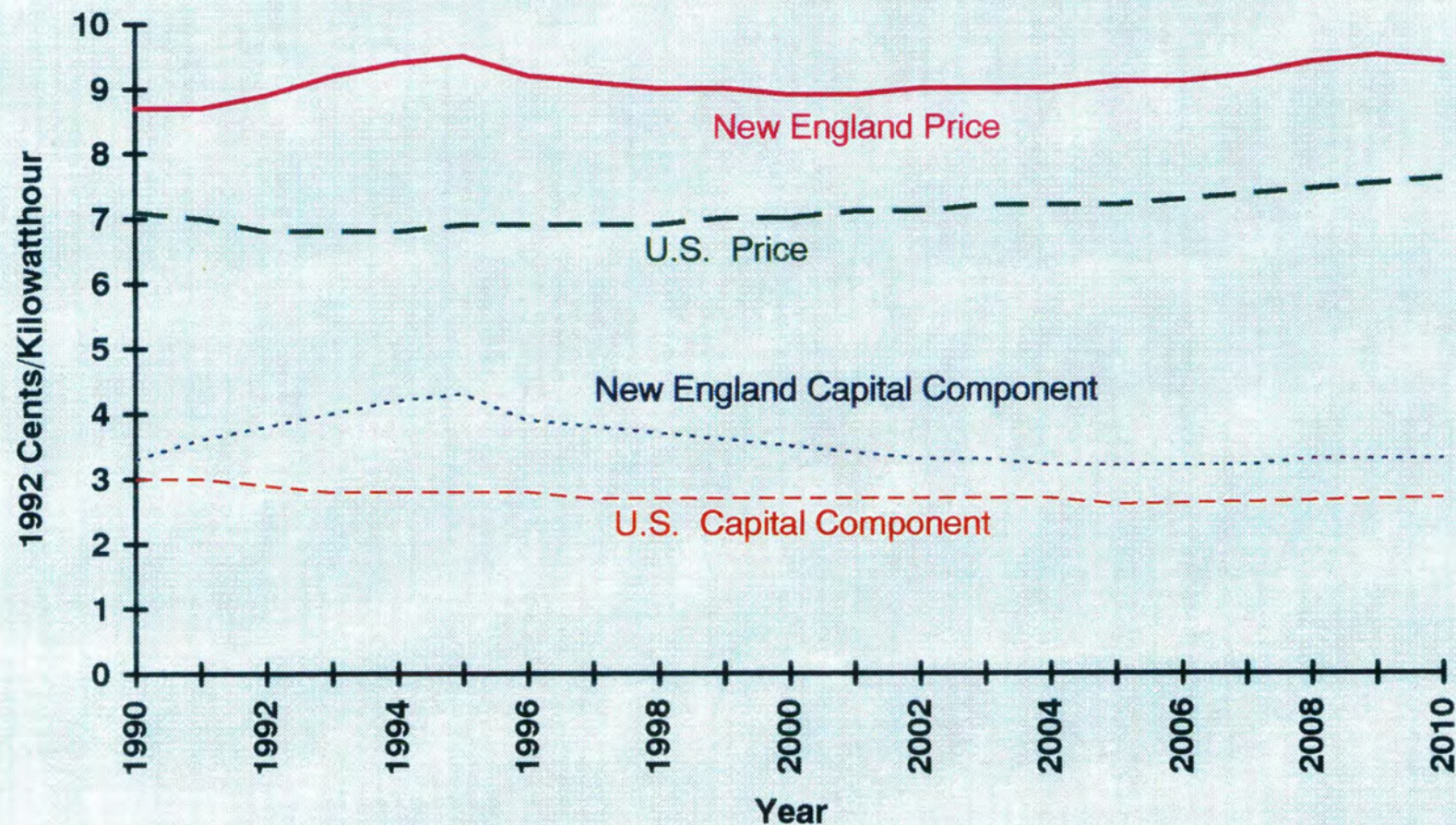


## Electricity Supply, 1990 and 2010 New England



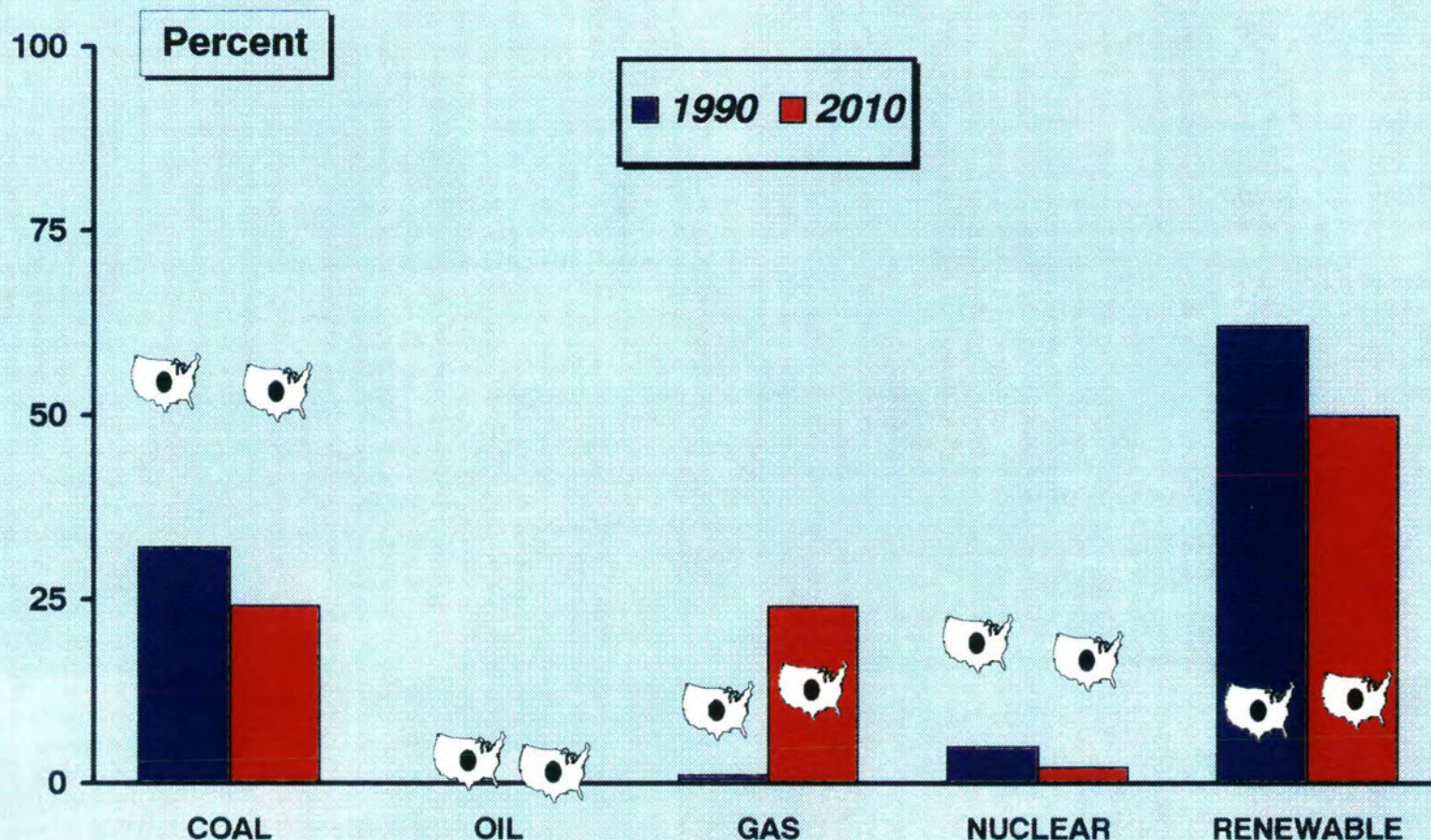


## New England Region Capital Component and Electricity Price



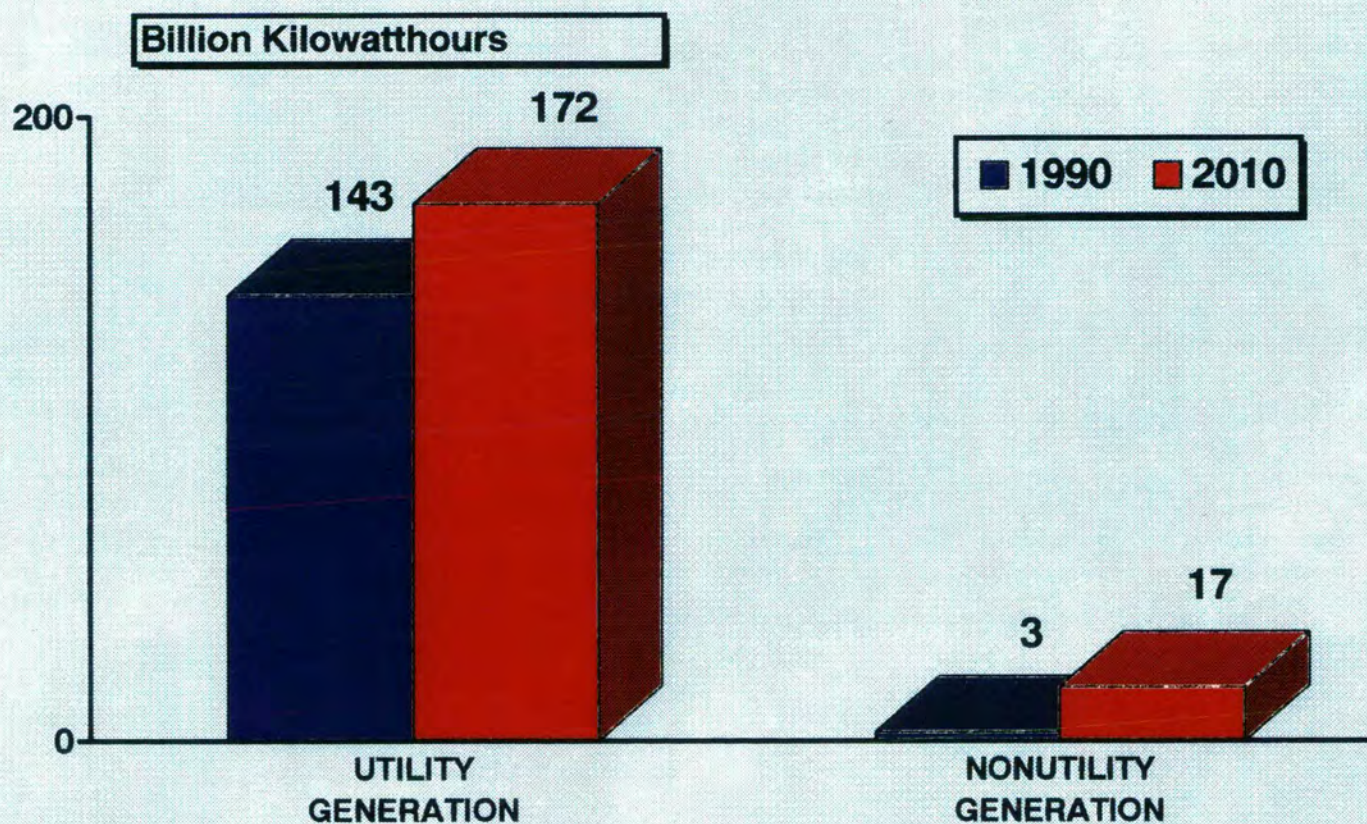


## Generation Share By Fuel, 1990 and 2010 Rocky Mountain - Arizona - New Mexico



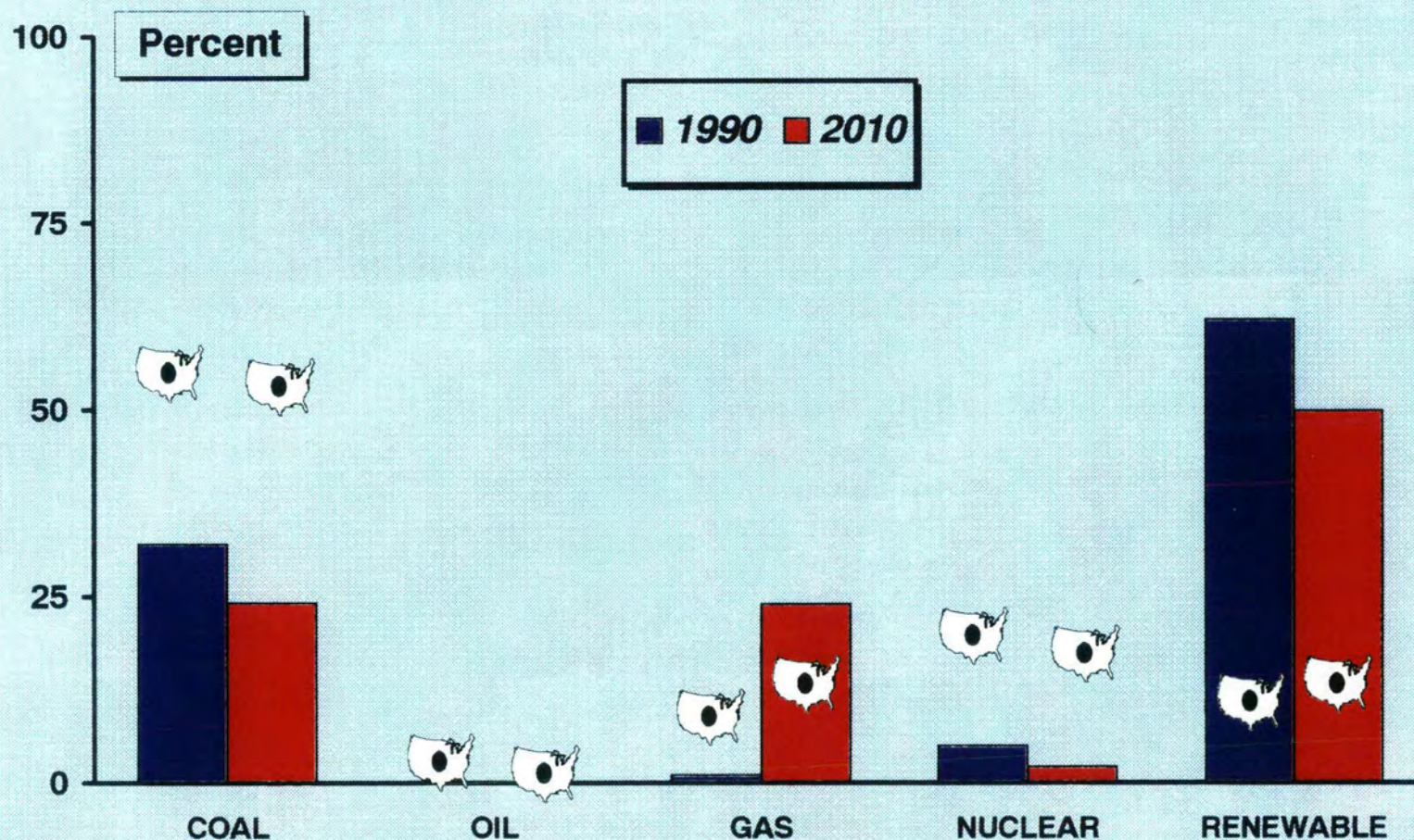


## Electricity Supply, 1990 and 2010 Rocky Mountain - Arizona - New Mexico



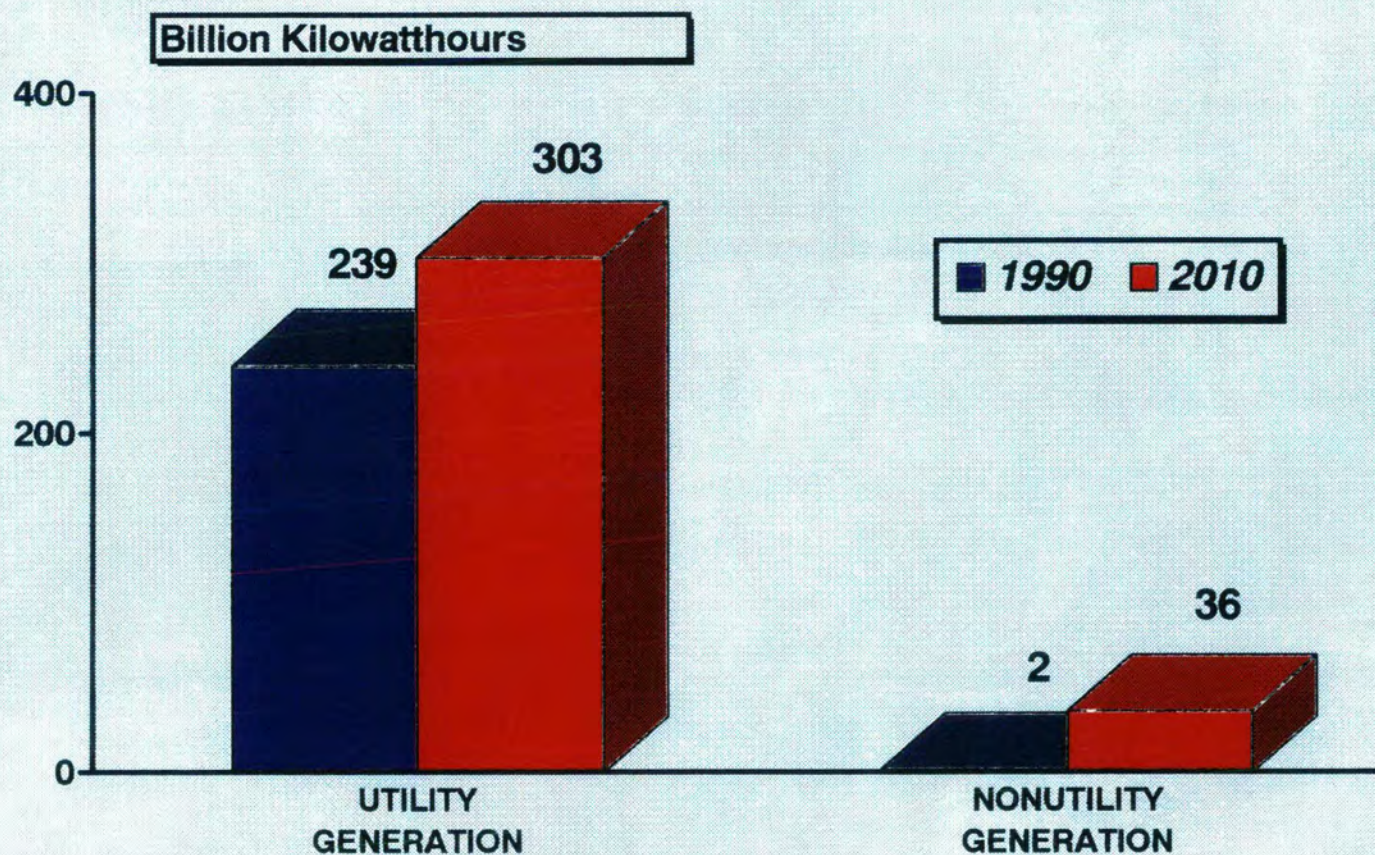


## Generation Share By Fuel, 1990 and 2010 Northwest Power Pool



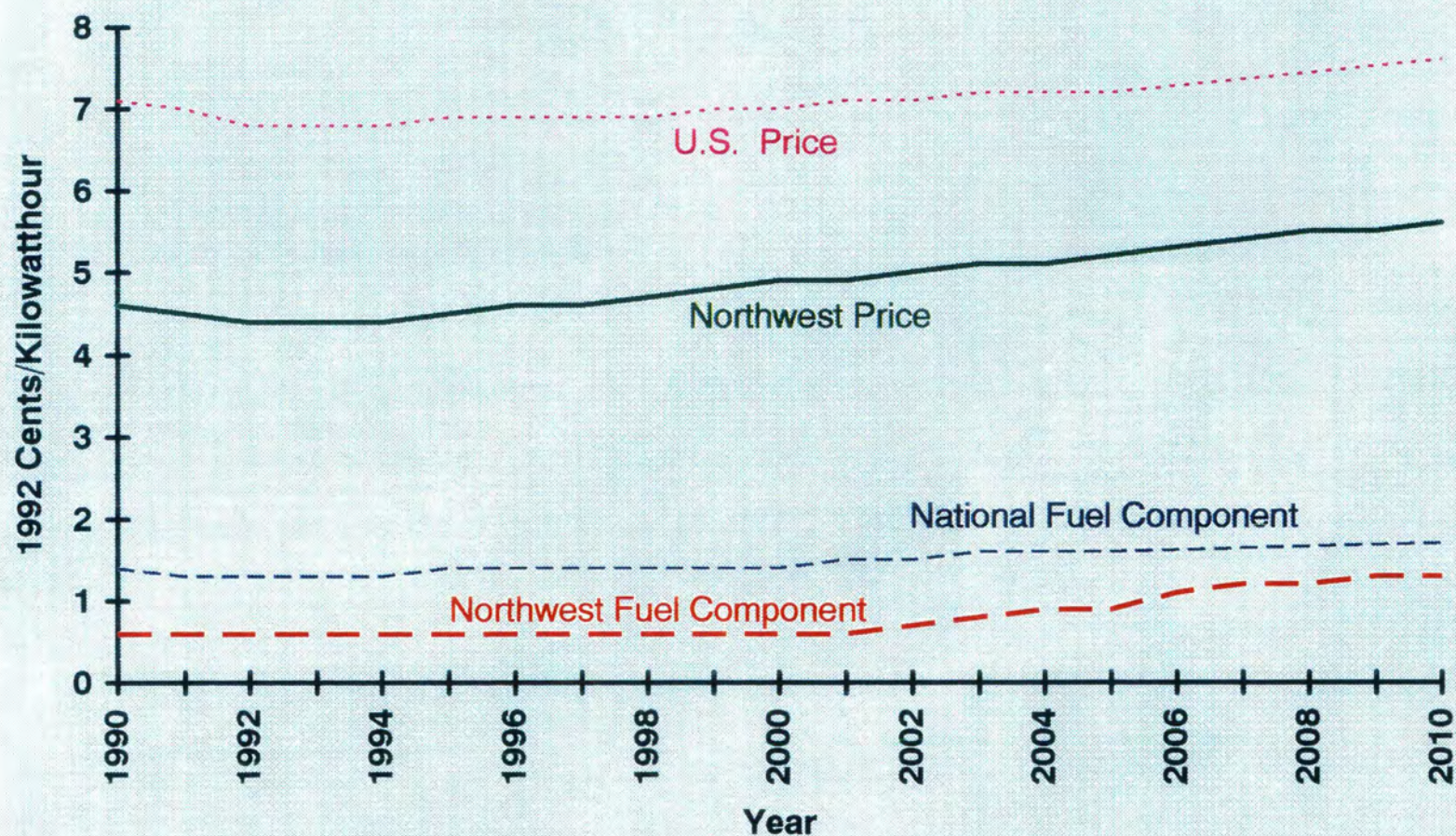


## Electricity Supply, 1990 and 2010 Northwest Power Pool



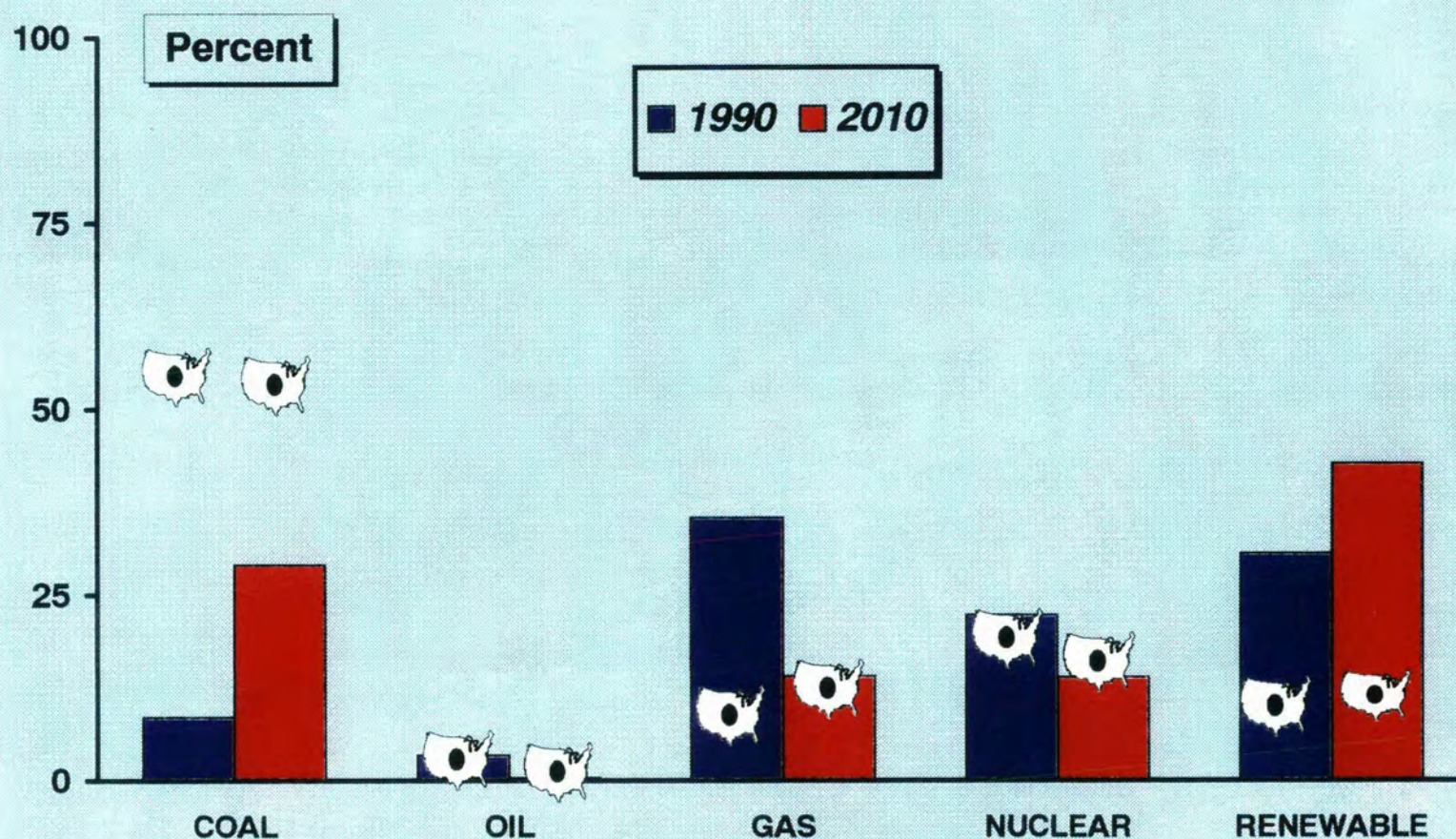


## Northwest Region Fuel Component and Electricity Price



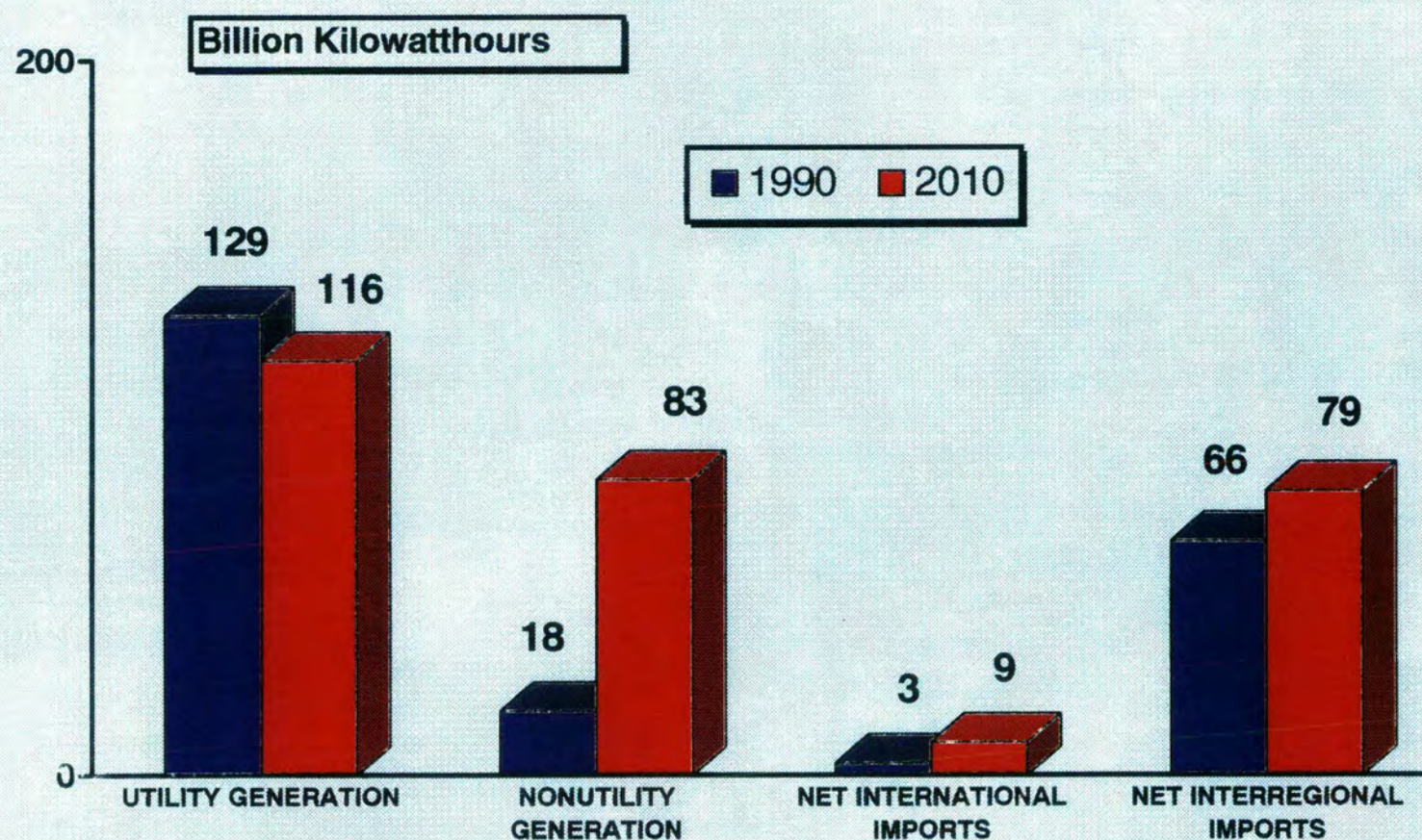


## Generation Share By Fuel, 1990 and 2010 California-Southern Nevada Power





## Electricity Supply, 1990 and 2010 California - Southern Nevada





## Uncertainties

- Demand Growth
- Gas / Oil Price Expectations
- Future of DSM Programs
- Climate Action Plan
- Technological Development