

VIDEO

AUDIO

1.
STOCK SHOT
NATURAL GAS FLARING OFF,
ROARING FLAMES, AN IMPRESSION
OF COLOSSAL ENERGY. THE
IMAGES OCCUPY FULL SCREEN
RATIO. AT A SUITABLE MOMENT,
THE CAMERA PULLS BACK TO
REVEAL THE PRESENTER SITTING
IN AN EDITING SUITE VIEWING
A TV MONITOR. HE TURNS TO
TO CAMERA

wishes
shoot

(The presenter should not be like a news reader. He should be natural, relaxed, informal. He should be able to make points with intellectual conviction which does not exclude the use of irony or wit.)

Shell Centre

TO CAMERA SYNC
Natural gas! Listen to the roar of this energy. Why does gas in certain locations get flared off? There's no need to warm up the desert. You don't burn off good energy if you can help it. The conclusion is straightforward. In many countries, the commercial value of natural gas cannot be realized.

There are two possible explanations. Either the cost of distribution is too high, or the nearby market is too small.

2.
STOCKSHOT
NORTH SEA GAS PIPELINE IN THE
CONSTRUCTION PHASE EMERGING
FROM THE SEA. PAN OFF TO ON-
SHORE PUMPING STATION.

nick

stock shot

SR V.O.

By contrast, North Sea gas is commercially valuable only because it is near a large concentration of consumers.

3.
STOCKSHOT
PIPELINE DISAPPEARS INTO THE
GROUND

nick

stock shot

V.O. *knige*
The capital investment in winning and distributing the gas is *still* ~~acceptable~~ *justified*.

X

4.
STOCKSHOT
GAS COOKER TURNING ON

nick

stock shot

V.O. ~~But~~ *because*
The ~~point of the~~ *The* thermal energy of the gas can, ~~the~~ *still* compete with electricity generated from coal, oil or nuclear fuels.

X

5.
INTERIOR EDITING SUITE
CAMERA PULLS BACK FROM SCREEN
TO REVEAL PRESENTER WHO TURNS
TO SPEAK TO CAMERA

shoot

SYNC TO CAMERA

But most of the natural gas in the world is left in the ground. For this, of course, there are no pictures.

5. CONTINUED
GESTURE OF THE HANDS, ONE
GOING UP THE OTHER GOING
DOWN

People in the hydrocarbon
business know that oil reserves
are declining while gas reserves
~~are increasing~~. The implications
of this projected to the end of
the century and into the next
warrant a new look at natural
gas.

*Proven gas reserves
increasing much
more rapidly
than oil
reserves*

Natural gas can already be turned
into methanol and gasoline. But
could natural gas be exploited as
a feed stock for a range of middle
distillates that are normally pro-
duced from petroleum?

Could natural gas substitute for
crude?

6.
GRAPHICS --TITLE

TURNING NATURAL GAS INTO
MIDDLE DISTILLATES

MUSIC FANFARE OR FLOURISH TO
BRIDGE INTO THE TITLE.

MUSIC

Nick 7.
EXTERIOR LDC COUNTRY
A BULLOCK CART OR SOME OTHER
FORM OF TRADITIONAL TRANS-
PORTATION IS IN FOREGROUND.
BY PANNING OR PULLING FOCUS,
ATTENTION SHIFTS TO A MODERN
HIGHWAY AND THE COMMERCIAL
DIESEL FUELLED TRAFFIC WHICH
OVERTAKES IT.

V.O.
Many developing countries which
have little or no crude oil have
a growing need for diesel and middle
distillates. What if local reserves
of natural gas could supply fuels
which today have to be imported?

*stock
The land must provide?*

THE SHOT EMPHASIZES THE TRANS-
FORMATION OF TRADITIONAL WAYS
BY MODERN TRANSPORTATION. THE
LOCATION MUST BE UNDERSTOOD TO
BE ABOVE OR NEAR KNOWN, UNEX-
PLOITED RESERVES OF NATURAL
GAS.

GRAPHICS SUPER OVER THE SHOT
A SUBTITLE--"THE STATUS QUO"

MUSIC?

ADD FLIES IN NEXT SHOT

*Stockshot Economics of
Castne Flame*

Nick

8.
EXTERIOR WELL-HEAD STOCKSHOT
A well established production
well head with a refinery or
storage tanks in the back-
ground. Pan or cut to gas
flaring off. Consider aerial
shot.
ADD FLIES IN NEXT SHOT

V.O.
Some countries have dwindling oil
reserves but ample reserves of
natural gas. What if this ~~wasted~~ *unexploited*
gas could replace some of the
petroleum feed stock? Spare
crude could then be traded on
the international market.

Nick

9.
EXTERIOR CITY (STOCKSHOT)
A city scape in Australia
or New Zealand. A view of a
bridge or an inner city
motorway with heavy traffic.

V.O.
Many developed countries with
little or no crude oil import
refined petroleum products to
meet their domestic consumption.
The same countries sometimes have
important reserves of natural gas
with no exploitable commercial value.
What if it could be refined into
middle distillates and reduce
imports?

ADD FLIES IN NEXT SHOT

Nick

10.
ADD INSETS PICTURES IN THE
PREVIOUS BACKGROUND SHOT

Natural gas flaring off.
Barren landscape under which
lie large reserves of natural
gas.

Castne flame

*The land must provide
Barren in landscape*

V.O.
~~The three examples broadly cover~~
~~the status of natural gas.~~ Around
the world there are numerous
reserves of this gas which are
left in the ground or
flared off. Should we think of
them as worthless, or should we
think of them as potentially
valuable reserves simply waiting
for a technology, a missing link,
to bridge the gap and make them
commercially exploitable?

2

11.
MONTAGE OF STOCKSHOTS
BUILDING UP AN IMPRESSION OF
SHELL RESEARCH

GRAPHICS SUB-TITLE SUPER
"THE RESEARCH STORY"
COMPUTER GRAPHICS OF CAD/
CAM OF MALAYSIA PLANT ROTATING

V.O.
The quest for a technology
that would make this gas
commercial has pre-occupied
scientists at Shell research
laboratories for many years.
MUSIC BRIDGE

hoof

12.
INTERIOR EDITING SUITE
PRESENTER TO CAMERA.
HE TURNS TO LOOK AT IMAGES
OF KSLA AMSTERDAM ONE THE
MONITOR.
ZOOM INTO SCREEN AND CUT TO

(PRESENTER TO CAMERA) Let's go
to Amsterdam.

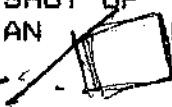
*Shell
Centre*

13. *Shoot* KSLA AMSTERDAM
PRESENTER INTERVIEWS
DR. ABBOTT

SYNC TO CAMERA
(A TIGHTLY EDITED QUOTE FROM SHELL
RESEARCH DIRECTOR, DR. ABBOTT
GIVING US SOME INSIGHT INTO THEIR
LINES OF ENQUIRY AND A FEELING
FOR THE RISK TAKING INVOLVED.)

14. *Shoot* INTERIOR AMSTERDAM PLANT
CUT TO

V.O. *plant*
We are looking at a pilot ~~facility~~
built by Shell. In one end goes
natural gas. Out the other end
comes . . .

15. *Shoot* WITH THE PILOT PLANT AS
BACKGROUND, INSET SHOT OF
Side NAPHTHA OUTPUT AND AN
APPLICATION OF IT
CUT TO 

V.O.
. . . naphtha . . .

16. *Stock* WITH A DIFFERENT SHOT OF THE
PILOT PLANT AS BACKGROUND
INSET SHOT OF GASOIL OUTPUT.
INSET SHOT OF DIESEL TANKER. *okay*

V.O.
. . . gasoil . . .

17. *Shoot* INSET A SHOT OF PARAFFIN
DRIPPING INTO A JAR. A
TECHNICIAN HOLDS UP THE JAR.
PAN OFF TO

V.O.
. . . kerosene . . .

18. *Shoot* SYNC TO CAMERA
PRESENTER TO CAMERA PICKS UP
A JAR OF WATER POURS IT INTO
A GLASS AND DRINKS IT OR POURS
IT ONTO A POTTED PLANT.

SYNC TO CAMERA
. . . oh and water.

19. *Shoot* SYNC TO CAMERA
INTERIOR OF CONTROL ROOM
PRESENTER WALKS INTO SHOT
AND SPEAKS TO CAMERA

SYNC TO CAMERA
What we see taking shape is
a technology that is known as
Shell Middle Distillate
Synthesis. We'll call it SMDS
for short.

20. *Shoot* GRAPHICS SUBTITLE SUPER
"THE SMDS PROCESS"
COMPUTER GRAPHICS VISUALS OF

V.O. *MUSIC*
It has three stages. First, you
partially oxidise natural gas to
produce

20. CONTINUED

A MOLECULAR STRUCTURE IN 3-D BUT SCHEMATIC RATHER THAN ULTRA ACCURATE. FLY IN THE CHEMICAL SYMBOLS AND BUILD THE EQUATION $CH_4 + 1/2 O_2$. THE MOLECULE NOW RE-ARRANGES ITSELF AND IT IS NOW $CO + 2H_2$.

synthesis gas or syngas--a mixture of carbon monoxide and hydrogen. This is known as the Shell Gasification Process or SGP for short.

21.

GRAPHICS THE MOLECULE NOW RE-ARRANGES INTO THE STRUCTURES THAT CORRESPOND TO C1, C2, GASOIL, KEROSENE AND PARAFFIN.

V.O. Stage two, known as Heavy Paraffin Synthesis or HPS converts carbon monoxide and hydrogen directly into paraffins.

22.

GRAPHICS TRACK IN 3-D OVER THE FRACTURED MOLECULES

V.O. A range of different sized molecules results--from methane, which contains only one carbon atom, to wax, which contains up to 50 ~~carbon atoms~~.

23.

GRAPHICS THE MOLECULES OF PARAFFIN NOW RE-ARRANGE INTO GASOIL AND KEROSENE MOLECULES

V.O. The third stage of SMDS involves cracking the long, heavy wax molecules to yield the desired middle distillate products. This is called Heavy Paraffin Conversion, or HPC for short.

24.

stack EXTERIOR LOCATION A SHOT OF EXISTING PLANT OR EXISTING PROCESS

V.O. Shell already has a tried and tested technology of hydro-conversion to do this job.

25.

GRAPHICS BUILD UP $SGP + HPS + HPC = SMDS$

V.O. Treat the natural gas; synthesize middle distillates plus paraffin; convert paraffin to more middle distillates. Where's the secret?

26.

4 GRAPHICS SUBTITLE "THE BREAKTHROUGH"

MUSIC BRIDGE

MUSIC 2

27.

COMPUTER GRAPHICS SLIDE IN THE FISCHER-TROPSCH EQUATION $n(CO + 2H_2) \rightarrow (-CH)_n + nH_2O + HEAT$. THE POINT IS

V.O. Since the 1930's when the technology of Fischer Tropsch catalysis was first invented, everybody has wanted the long

to obtain

27. CONTINUED

NOT TO STUDY THE EQUATION BUT TO CREATE ANIMATION SO THAT IT COLLIDES WITH THE MOLECULE AND PRODUCES FRACTIONS THAT GO TO DIFFERENT PARTS OF THE SCREEN UNDER LABELS

chain molecules that middle distillates are made of and not the smaller, lighter molecules of butane and propane, the very constituents of natural gas that the process is trying to convert.

making of hydrogen gas over the catalyst which already exists

which makes

28. COMPUTER GRAPHICS A GRAPH OF THE ALPHA VALUES

V.O. The probability of chain growth in this process is expressed as a value 'alpha.' Catalysts that have low alpha values produce more smaller molecules.

29. COMPUTER GRAPHICS THE SAME GRAPH WITH ANIMATION TO EXPRESS THE LOW END OF THE SCALE

V.O. The commercial application of Fischer Tropsch catalysis has always been thwarted by low alpha values.

Short 30. EXTERIOR. AMSTERDAM RESEARCH CENTRE.

V.O. Scientists at Shell's Amsterdam laboratories have . . .

Short 31. INTERIOR C.U. GRANULES INSET IN LAB BACKGROUND

V.O. . . . developed a catalyst with very high alpha values.

32. GRAPHICS SHOWING ALPHA DIAGRAM WITH ANIMATION TO EXTEND THE CHART AND SHOW IMPROVED YIELD.

V.O. This important technological breakthrough means that the formation of long chain, heavy wax molecules can be significantly increased . . .

33. GRAPHICS ANIMATION OF CHART

V.O. . . . because the catalyst is highly selective for middle distillate and wax production and minimizes the production of smaller molecules.

Short 34. INTERIOR AMSTERDAM PLANT PAN DOWN COLUMN OF GRANULES FLY OUT C.U. OF GRANULES FLY NEXT IMAGE OUT OF COLUMN

V.O. Syngas at the right temperature and pressure is passed through a column packed with granules of the new catalyst.

rusher
35. INTERIOR AMSTERDAM PLANT
WIDE SHOT OF ELECTRON
MICROSCOPE.
C.U. OF MONITOR SCREEN.

V.O.
Seen under the electron
microscope, these apparently
featureless granules reveal
a complex infrastructure.

rusher
36. INTERIOR AMSTERDAM PLANT
BIG MAGNIFICATION OF THE
GRANULES

V.O.
Their effectiveness depends
on the pore diameter,
measured in millionths of a
millimetre, and the precise
combination of metals that
coats them.

Shoot
37. INTERIOR AMSTERDAM PLANT
A GRAM OF THE GRANULES IN
A HEAP IN THE MIDDLE OF A
MARKED OUT SQUARE OF TEN
METRES. ZOOM FROM C.U. OF
GRANULES IN THE HAND OF THE
PRESENTER TO WIDE SHOT OF
HIM STANDING IN THE SQUARE.

V.O.
Each gram of the catalyst has an
effective surface area of 100
square metres.

Shoot
38. INTERIOR AMSTERDAM PLANT
PRESENTER TO CAMERA

SYNC TO CAMERA
This is one reason for the
very high conversion yields
that can be achieved with a
small volume of catalyst.
The elegance of the SMDS
technology lies in putting
together two processes.

39. GRAPHICS
REPLAY MOLECULAR STRUCTURE
FORMING LONG CHAINS

V.O.
High alpha values in HPS and
highly selective cracking in
HPC minimise the formation
of small gas molecules.

40. GRAPHICS
REPRESENT MOLECULE BY VOLUME
SUPER FIGURE OF 90%

alpha chart

V.O.
The result can be as high as
90% selectivity for middle
distillate products.

Stock
41. DIESEL TANKER FILLING UP
AT REFINERY

*Highland distribute
okay*

V.O.
The three stage process also
allows a high degree of
flexibility in plant output.

42.
GRAPHICS SUPERIMPOSED ON
PREVIOUS SHOT TO SHOW IN
FIGURES THE PRODUCT BREAK
DOWN: 60% GASOIL, 25%
KEROSENE AND 15% NAPHTHA.

V.O.
It can be run to favour gasoil
production

43.
GRAPHICS SUPERIMPOSE ON SHOT
OF TANKER REFUELLING AIRCRAFT

V.O.
. . . or it can be run to favour
kerosene production.

Stock

Have Product Will Travel

44.
PRESENTER TO CAMERA

SYNC TO CAMERA
The quantum leap in efficiency of
production together with this
flexibility to adjust to market
requirements ~~commercial~~
~~importance.~~ *opportunity*

Shoot

This

45.
INTERVIEWS ON CAMERA
THE PRESENTER IN VISION.

SYNC TO CAMERA
(Tightly edited interviews with
Roland Williams and Dr. Abbott,
giving us an insight into the
thinking which led from pure re-
search to industrial innovation
and into the decisions which led
to results.)

Shoot

*Shell
Centre*

46.
GRAPHICS SUBTITLE
"TESTING THE PRODUCTS"

MUSIC BRIDGE

5

more 3

47.
INTERIOR THORNTON
SCIENTIST POURING OUT GASOIL
FROM BEAKER FOR TESTING.
POURING OUT CONVENTIONAL
GASOIL.
PRESENTER OR SCIENTIST SMELLS
THE TWO SAMPLES AND REACTS.

V.O.
~~There is another~~ *Because of the natural gas*
bonus in SMDS technology. ~~produces~~
feedstock ~~middle distillates~~
of exceptional purity.
They are virtually without odour.

Shoot

KCLA AMSTERDAM

KSLA

48.
EXTERIOR THORNTON

V.O.
At the Thornton Research Centre
in England . . .

rushes

49.
INTERIOR THORNTON
MONTAGE OF TESTS OF CETANE
NUMBER, VISCOSITY, COLD FLOW,
DENSITY.
ON EACH ACTIVITY SUPERIMPOSE
A COMPARISON RESULT IN
NUMBERS OF EACH TEST.

V.O.
. . . Shell scientists have
measured the properties of SMDS
produced gasoil against the
conventional product.
The SMDS gasoil exceeds the
requirements of today's
diesel fuel market.

rushes

KSLA Amsterdam - 9 -

Shoot

50. INTERIOR THORNTON
TECHNICIAN POURS BEAKER OF
SMDS GASOIL INTO ORDINARY
GASOIL. SUPERIMPOSE GRAPHICS
SHOWING LINEAR BLENDING GRAPH

V.O.
It has the linear blending
characteristics of
conventional refinery
produced gasoil.

new bus full of blacks *compression ignition engine*

Nick

51. STOCKSHOT
SHELL PRODUCT IN A LOCAL
MARKET WHERE THIS PROBLEM
EXISTS.

This means it can be used to ~~quality~~
upgrade poorer fuels to ~~meet~~ *local*
~~product and local markets to~~
the quality requirements of markets

Nick

52. SHELL TANKER APPROACHES AIR-
CRAFT ON TARMAC AND BEGINS
REFUELLING.

okay

V.O.
Airline traffic is increasing
and the demand for aviation
kerosine is growing. The speci-
fication for Jet A-1 aviation fuel
is rigorous.

pusher

53. INTERIOR THORNTON
BENCH TEST OF KEROSENE FLAME

V.O.
The height to which a
kerosine flame can be raised
before it begins to smoke,
its smoke point, indicates
its tendency to produce soot
on combustion.

pusher

54. INTERIOR THORNTON
BENCH TEST OF SMDS KEROSENE

V.O.
Aviation requirements are that it
should not smoke below 19 milli-
metres. SMDS kerosine does not
smoke before 110, exceeding the
specification by ~~six~~ *six* times.

needs

pusher

55. INTERIOR THORNTON
MONTAGE OF TEST BED, SENSORS
COMBUSTORS. SOOT-DAMAGED
COMBUSTORS.

V.O.
The Thornton Research Centre
uses full scale combustors and
the most sophisticated equipment
to test jet fuel. Sensors
inside the combustor measure
thermal radiation and exhaust
emissions.

pusher

56. INTERIOR THORNTON
COMPARISON OF COMBUSTOR USING
SMDS FUEL.

V.O.
SMDS kerosine generates four
times less soot than do
ordinary fuels.

KSLA

Shoot

57. INTERIOR ~~THORNTON~~
SHOT OF MIXING SMDS WITH AN ORDINARY KEROSENE. COLOUR DIFFERENCE IS EVIDENT. WITH GRAPHICS SUPERIMPOSITION, SHOW GRAPH OF BLENDING CHARACTERISTICS.

V.O.
When you mix it with refinery produced kerosines which do not meet the stringent requirements for Jet A-1 fuels, you get an upgraded product due to the linear blending characteristics of SMDS kerosine.

Shoot + rushes

58. EXTERIOR AMSTERDAM
IMPRESSION OF SIZE AND COMPLEXITY BUILT UP WITH DETAIL FRAMING FIXED BED REACTORS. CONTROL ROOM SHOTS SHOW THE DEGREE OF PRE-INDUSTRIAL STAGE DEVELOPMENT.

V.O.
The industrial scale pilot plant in Amsterdam was built to prove the catalyst and verify operational technology. The long catalyst life and stability admit the use of well established multi-tubular fixed bed reactors for the Fischer-Tropsch synthesis.

rushes

59. INTERIOR AMSTERDAM
CAD/CAM IMAGES ROTATE. CUT TO

V.O.
The SMDS process is ready for full scale commercial operation.

rushes

60. EXTERIOR MAYLAISIA ^{design} STOCK SHOT OF PLANT SITE MIX TO MODEL OF PLANT ON SIGHT.

V.O. *The first full scale plant.*
~~A plan to apply SMDS to exploit natural gas is already at an advanced stage of design.~~

Nick

61. EXTERIOR
NATURAL BEAUTY SHOT OF THIRD WORLD ENVIRONMENT

Therefore

Environmental impact of SMDS technology is very low.

Rushes

Nick

62. INTERIOR AMSTERDAM
WASTE PRODUCTS AND RECYCLING PIPES. WASTE PIPES. EFFLUENT WATER. MIX TO SCENES OF FISHING ON A RIVER OR LAKE PREFERABLY IN THIRD WORLD.

Because

Process water and steam condensate can be used again. All waste water can easily be treated to allow release into a river. So the only effluents are clean water and sulphur free flue gas.

the SMDS plant is self-sufficient

Rushes

63. INTERIOR THORNTON
RESEARCH SHOT

V.O.
Shell has bridged the technological gap.

Rushes

64. CAD/CAM OF MAYLAISIA PLANT ROTATING

V.O.
Shell Middle Distillate Synthesis is about to become a commercial reality.

now

65. GRAPHIC SUBTITLE
COMMERCIAL IMPLICATIONS

Nick

65. STOCK SHOT OF NATURAL GAS FLARING OFF

or significantly change

V.O. What is likely to be the ~~impact~~ *will* of the SMDS technology on the uses of natural gas?

Nick

66. INTERIOR LONDON EXCHANGE FOR BRENT, HEATING OIL FUTURES, TRADING FLOOR, PRICES.

V.O. What are the commercial implications of ~~the~~ *SMDS technology*

Shoot

67. INTERIOR SHELL OFFICE TO CAMERA INTERVIEWS

SYNC TO CAMERA INTERVIEW WITH ROLAND WILLIAMS EDITED TOGETHER IN A TIGHT MONTAGE.

Shoot

68. INTERVIEW *90% graph. supered one plant.*

SYNC TO CAMERA The promise of SMDS rests on ~~its~~ high yield ~~and~~ cost-effective production.

X

Shoot

69. INTERVIEW *diesel tanks filling up at refinery*

SYNC TO CAMERA ~~It offers~~ flexibility to match ~~the~~ production slate to market requirements.

X

Shoot

70. INTERVIEW *purifying shot*

... ON

SYNC TO CAMERA ~~It provides~~ exceptional purity ~~and~~ that ~~it~~ can integrate existing refinery production and upgrade poorer quality distillates. *and*

X

Nick

71. GAS FLARE IN DESERT *okay*

V.O. It means reserves that were worthless because of their geographical location . . .

Nick

72. VARIATION OF LDC DIESEL SHOT TRUCK PULLING IN TO TANK UP. *okay*

V.O. . . . can be turned into liquid assets, economies transformed.

Nick

73. LDC COUNTRY TRAFFIC JAM OF LORRIES *okay*

V.O. Middle distillates is a growth market.

Shoot

74. COMPUTER GRAPHICS OF PARAFFIN MOLECULE CRACKING (REPRISE)

V.O. The gas technology is there.

(64)

user \$

It ~~has opened~~ ^{opens} the door to a whole
new ~~range~~ ^{field} of applications for
natural gas.

- 12 -

Shot

75.
PRESENTER IN EDITING SUITE
TV MONITOR IN BACKGROUND
ZOOM INTO SCREEN THEN CUT TO

SYNC TO CAMERA
The potential is there
for those who have the
imagination and the initiative to
seize the opportunity.

Pushes

76.
STOCK SHOT
FINAL IMAGE OF CAD/CAM
REVOLVING WITH BACKGROUND OF
GAS FLARE WHICH FREEZES AND
TRANSFORMS INTO POURING LIQUID
OF MIDDLE DISTILLATE PRODUCT.

The opportunity is there for
MUSIC the taking.

*end music
turning*

*Music for title
music for bridges
music for CAD/CAM.*