

Furnace Improvements

Maximize Profits by Revamping Fired Heaters

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SUPPLY OF NEW HEATERS

1. **Client Project** **Citgo**
FIS-247: Design, Engineering & Supply of a 40 MMBtu/hr Combined Feed Heater

2. **Client Project** **Phillips 66**
FIS-269D: Design, Engineering & Supply of a 42.82 MMBtu/hr Vacuum Heater

3. **Client Project** **Devon Energy**
FIS-279: Design, Engineering, Supply & Erection of 25 MMBtu/hr Hot Oil Heater

4. **Client Project** **Phillips 66**
FIS-286B: Design, Engineering, Fabrication, and Supply of a 165 MMBtu/hr Hot Oil Heater

5. **Client Project** **NTS Systems**
FIS-379: Design and Engineering of 2 new 2.67 MMBtu/hr High Temperature Air Heaters

6. **Client Project** **Staatsolie**
FIS-384: Design, Engineering, Supply of 8.82 MMBtu/hr Visbreaker Charge Heater

7. **Client Project** **Gladieux Processing**
FIS-392: Design, Engineering, & Supply of 30 MMBtu/hr Hot Oil Heater

8. **Client Project** **Sealion Technologies**
FIS-394: Design, Engineering, Supply of a 0.44 MMBtu/hr Reactor Heater

9. **Client Project** **Fluor/ Sasol Chemicals**
FIS-439: Design, Engineering, Supply of a 126 MMBtu/hr Hot Oil Heater with APH, SCR, and Ammonia System

Highest Capacity - Longest Run Length - Maximum Profits

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List of Projects

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| 10. Client Project | Country Mark
FIS-475: Design, Engineering, Supply and Erection of a 25 MMBtu/hr Reactor Charge Heater |
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HEATER REVAMP PROJECTS

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|---------------------------|--|
| 1. Client Project | Alon USA
FIS 126: Revamp of Atmospheric Heaters and Vacuum Heater |
| 2. Client Project | Citgo
FIS 183: No.4 Platformer Heater Efficiency Improvement using Split Flow Convection and NOx Reduction |
| 3. Client Project | Phillips 66
FIS 185: CFHT Efficiency Improvement and NOx Reduction |
| 4. Client Project | Citgo
FIS-187: Reboiler Trim Heaters Efficiency Improvement |
| 5. Client Project | Phillips 66
FIS 188: CCU1 CO Heater Convection Section Replacement |
| 6. Client Project | Premcor
FIS 204: Crude Furnace NOx Reduction and Capacity Increase |
| 7. Client Project | Husky Oil
FIS 208: Crude Furnace Revamp for NOx Reduction and Efficiency Improvement |
| 8. Client Project | Phillips 66
FIS 210: NOx Reduction Project for Reformer Furnace |
| 9. Client Project | Alon USA
FIS-224: FCCU Feed Preheater |
| 10. Client Project | Valero
FIS-242: NHT and Platforming Heaters Capacity Increase with Patented Split Flow Technology |

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List of Projects

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| 11. Client Project | Valero
FIS-248: Platformer Heater Capacity Increase with patented Split Flow Technology |
| 12. Client Project | Phillips 66
FIS-254C: NOx Reduction in Crude Heater |
| 13. Client Project | Valero
FIS-255: Capacity Increase Revamp Project of Charge Heater |
| 14. Client Project | Alon USA
FIS 260: Capacity Improvement of Reactor Charge Heater |
| 15. Client Project | Phillips 66
FIS-263B: U40 Boiler NOx Reduction Project |
| 16. Client Project | Phillips 66
FIS-266C: Alky Heater NOx Reduction Project |
| 17. Client Project | Alon USA
FIS-275: Replacement of FCC Feed Preheater |
| 18. Client Project | Valero
FIS-280: CDHDS Reboiler Heater Efficiency Improvement |
| 19. Client Project | CountryMark CO-OP
FIS-283: Vacuum Heater Capacity Increase |
| 20. Client Project | Phillips 66
FIS-287: CO Boiler Convection Replacement |
| 21. Client Project | Lion Oil Eldorado Refinery
FIS-290: NOx Reduction Project |
| 22. Client Project | Alon USA
FIS-296: Hydrogen Heater Capacity Improvement |
| 23. Client Project | Phillips 66
FIS-299: Convection Section Modification in CO Heater for SCR Installation |

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List of Projects

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| 24. Client Project | Phillips 66
FIS-301B: Radiant Retubing of Crude Heater |
| 25. Client Project | Phillips 66
FIS-301C: Ultra-Low NOx Burners for Crude Heater |
| 26. Client Project | Alon USA
FIS-303B: Naphtha Stabilizer Reboiler Heater Capacity Increase |
| 27. Client Project | Alon USA
FIS-311: Installation of New RFG Package Boiler |
| 28. Client Project | CountryMark CO-OP
FIS-314: Naphtha Splitter Reboiler Revamp -Capacity Increase |
| 29. Client Project | Phillips 66
FIS-315B: HDU-H1 Heater Revamp |
| 30. Client Project | Phillips 66
FIS-320: Duct Work |
| 31. Client Project | Alon USA
FIS-329B: HDS Depentanizer Reboiler and Reformer Depentanizer Reboiler Revamp |
| 32. Client Project | HPCL
FIS-333: Capacity Improvement of Crude and Vacuum Heaters |
| 33. Client Project | Phillips 66
FIS-335: NOx Reduction & Capacity Increase of Unit Heaters |
| 34. Client Project | Sinclair
FIS-338: Performance Improvement on 3 Platformer Heaters |
| 35. Client Project | HPCL
FIS-339: Capacity Improvement of FRE APS and VPS Heaters |
| 36. Client Project | Phillips 66
FIS-360B: Coker Preheater Revamp |

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List of Projects

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| 37. Client Project | HPCL
FIS-364B: Extract Recovery Heaters and Raffinate Recovery Heaters in SEU Units Revamp |
| 38. Client Project | Phillips 66
FIS-366B: Heater Rerating |
| 39. Client Project | CountryMark
FIS-367C: DHT Charge Heater Revamp - Capacity Increase |
| 40. Client Project | Phillips 66
FIS-373: Oil Coil Metallurgy upgrade in CCU1 CO Boiler |
| 41. Client Project | Phillips 66
FIS-373B: New Burners for CO Boiler |
| 42. Client Project | Phillips 66
FIS-374: CAU H 503 Heater Revamp |
| 43. Client Project | Phillips 66
FIS-375: Waste Heat Boiler for SCR Installation |
| 44. Client Project | Phillips 66
FIS-399: New Gas Burners for CO Boiler |
| 45. Client Project | Phillips 66
FIS-401C: Convection Section and Stack for DHT Heater |
| 46. Client Project | Phillips 66
FIS-402B: Crude Heater Revamp |
| 47. Client Project | Holly Frontier
FIS-410B: Coker Heater Burners Modification |
| 48. Client Project | Total
FIS-414C: Pilot Burners for Reactor Charge Heater |
| 49. Client Project | LyondellBasell
FIS-417: Burner replacement for Auxiliary Boilers |

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|--------------------|--|
| 50. Client Project | Phillips 66
FIS-425 HCU Main Fractionator Reboiler Heater Revamp |
| 51. Client Project | Phillips 66
FIS-427 DU-2 Crude Heaters Revamp |
| 52. Client Project | Valero
FIS-428 H-16 Crude Heater Revamp with FIS Patented Inclined Burners |
| 53. Client Project | NARL
FIS-430B New Tube Supports for Crude Heater |
| 54. Client Project | Alon USA
FIS-433C NOx Reduction of Catalytic Reformer Heater |
| 55. Client Project | Alon Big Spring Refinery
FIS-435 Boiler Up-gradation Project |
| 56. Client Project | Lyondell Basell
FIS-437B 736 Delayed Coke Heaters Revamp |
| 57. Client Project | Phillips 66
FIS-440 ULD Heater Revamp |
| 58. Client Project | CITGO
FIS-444 41-H-1 and 41-H-2 APH System Revamp |
| 59. Client Project | Phillips 66
FIS-451 Radiant Retubing of Delayed Coker Heater |
| 60. Client Project | Valero
FIS-452 Charge Heater Visbreaker Revamp |
| 61. Client Project | Phillips 66
FIS-453 New Economizer for CCU-1 Heater |
| 62. Client Project | Phillips 66
FIS-454 Convection Retubing of Crude Heaters |

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List of Projects

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| 63. | Client Project | Lyondell Basell
FIS-463B 737 Delayed Coker Heaters |
| 64. | Client Project | Phillips 66
FIS-466 Coker Heaters Radiant Coil Upgrade |
| 65. | Client Project | Phillips 66
FIS-467 CO Heater SSH Coil Supply |
| 66. | Client Project | Phillips 66
FIS-476 New Stack for CR-1 Heater |
| 67. | Client Project | Phillips 66
FIS-481 New Radiant Hook Hangers for Heaters |
| 68. | Client Project | Phillips 66
FIS-484 New Stack Cap for Stabilizer Reboiler Heater |
| 69. | Client Project | Phillips 66
FIS-485 ULD Stabilizer Reboiler Heater Revamp |
| 70. | Client Project | Phillips 66
FIS-486 DU-2 Crude Heater Revamp |
| 71. | Client Project | Phillips 66
FIS-451B/487 Radiant Retubing and Convection Hairpins for Delayed Coker Heater |
| 72. | Client Project | CITGO
FIS-488 Supply of Peep Doors |
| 73. | Client Project | Phillips 66
FIS-489 New Pressure Parts for Heaters |
| 74. | Client Project | Phillips 66
FIS-490 New Convection Section, Ducting and Stack for Crude Heater |
| 75. | Client Project | Valero
FIS-491 APH Replacement for Heater |

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List of Projects

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| 76. Client Project | Delek US
FIS-492 New Stack for Alkyl Hot Oil Heater |
| 77. Client Project | Phillips 66
FIS-493 New Radiant Hangers for ULD Stabilizer Reboiler Heater |
| 78. Client Project | Phillips 66
FIS-495B Heaters SG Coil Retubing |
| 79. Client Project | Delek US
FIS-496 Revamp of Crude Heaters |
| 80. Client Project | Phillips 66
FIS-497B Engineering and Supply of New Stack for HCNHT F-1 Charge Heater |
| 81. Client Project | Phillips 66
FIS-498 CCU-2 New Steam Drum |
| 82. Client Project | Marathon Petroleum LP Refinery
FIS-499 Alky Heater Stack CEMS Platform |

ENGINEERING STUDIES

- | | |
|-------------------|--|
| 1. Client Project | Alon USA
FIS-125: Engineering Study of Crude and Vacuum Heaters |
| 2. Client Project | LyondellBasell
FIS-128: Engineering Study of Crude Heaters |
| 3. Client Project | LyondellBasell
FIS-141: Tuning of Heaters |
| 4. Client Project | Alon USA
FIS-157A/B: Engineering Study of Crude Heater and Vacuum Heater |

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List of Projects

5. **Client Project** **Air Products**
FIS-168: Field Survey/Recommendation for Oxygen Analyzers in Feed Preheaters

6. **Client Project** **Phillips 66**
FIS-172: Engineering Study for Reducing Coking in a Crude Heater

7. **Client Project** **Air Products**
FIS-179: Engineering Study for POX Unit Heaters

8. **Client Project** **Phillips 66**
FIS-185: Engineering Study for Design of a New Convection section and Recommendations for Improved Performance of CFHT Heater – Installation of Burners

9. **Client Project** **Phillips 66**
FIS-188: Process Design for CCU1 CO Heater Convection Section Replacement

10. **Client Project** **Air Products**
FIS-191: Survey of LOX Vaporizer

11. **Client Project** **LyondellBasell**
FIS-212 Vacuum Heater (6F-2) Study

12. **Client Project** **Phillips 66**
FIS-217: Rerating Report for Heat Medium Heater

13. **Client Project** **Phillips 66**
FIS-220: Field Survey Report (B-2B) Crude Heater

14. **Client Project** **Phillips 66**
FIS-231: Design and Engineering for Unit 9 Low NOx Burners

15. **Client Project** **Phillips 66**
FIS-236: Rerating of Platformer Charge Heater /Reactor Fired Heater

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List of Projects

16. **Client Project** **Phillips 66**
FIS-246: Engineering Study to Increase Capacity of Isocracker Charge Heater
17. **Client Project** **Phillips 66**
FIS-250: Evaluation and Re-rating of the H-1 fired heater for KHT Revamp Project. Detailed Engineering & Project Services for Burner Replacement in CFHT Heater
18. **Client Project** **Phillips 66**
FIS-251: Re-rating Study for CCU2 CO Heater
19. **Client Project** **Phillips 66**
FIS-253: Energy Audit of 4 Fired Heaters
20. **Client Project** **Phillips 66**
FIS-258: Engineering Study for NOx Reduction and Efficiency Improvement for Alkylation Unit Reboiler Heaters
21. **Client Project** **Phillips 66**
FIS-259: CR-3 Process Heaters - NOx Reduction Study
22. **Client Project** **Phillips 66**
FIS-263B: Engineering Study to convert Unit 40 CO Boiler to Fuel Gas Fired Boiler
23. **Client Project** **Phillips 66**
FIS-269: Engineering Study for Vacuum Heater and Transfer Line Rerating
24. **Client Project** **Phillips 66**
FIS-270: Performance Improvement Study for Vacuum Heaters
25. **Client Project** **Phillips 66**
FIS-271: CCU-1/CCU-2 Steam Drums Re-Rate Study
26. **Client Project** **Phillips 66**
FIS-272: Capacity & Efficiency Improvement Study of Crude and Vacuum Heaters

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|--------------------|--|
| 27. Client Project | Phillips 66
FIS-276: Re-rating for SCR Installation in CCU2 CO Heater |
| 28. Client Project | Phillips 66
FIS- 285: NOx Reduction in Heaters and Engineering |
| 29. Client Project | Phillips 66
FIS-286: BEU Heat Medium Heater NOx Reduction Study |
| 30. Client Project | Phillips 66
FIS-291: SCR Installation Feasibility Study on Steam Methane Reformer |
| 31. Client Project | Phillips 66
FIS-292: Engineering Study for Reducing NOx in Boiler No. 15 |
| 32. Client Project | Phillips 66
FIS-297: Engineering Study of Fractionator Heater |
| 33. Client Project | Phillips 66
FIS-301: Process Design Package for retubing of Crude Heater |
| 34. Client Project | Alon USA
FIS-303: Engineering Study of Naphtha Stabilizer Reboiler Heater |
| 35. Client Project | Phillips 66
FIS-315: Process Design Package for NOx Reduction of HDU2 Heater |
| 36. Client Project | Phillips 66
FIS-318: Efficiency Improvement Study for Depropanizer Reboiler Heater |
| 37. Client Project | Phillips 66
FIS-323: Field Optimization of Three Fired Heaters |
| 38. Client Project | Phillips 66
FIS-328: Engineering Study of Crude Heaters |
| 39. Client Project | Alon USA
FIS-329: Engineering Study of Two Reboiler Heaters |

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| 40. | Client Project | Phillips 66
FIS-347: Engineering Study of Boiler BO-202 for Reliability Assessment |
| 41. | Client Project | LyondellBasell
FIS-352: NOx Reduction Study of Steam Superheater Furnace |
| 42. | Client Project | IOCL, Bongaigaon
FIS-353: Efficiency Improvement Study CDU-I Crude Heater |
| 43. | Client Project | Phillips 66
FIS-361: Burner Replacement Study for Diesel HDS Heater |
| 44. | Client Project | HPCL
FIS-364: Engineering Study and Process Package for SEU Heaters Revamp |
| 45. | Client Project | Phillips 66
FIS-366: Modeling Study of Heater |
| 46. | Client Project | Belgian Refining Corp
FIS-368: Engineering Study for B0702 Vacuum Feed Heater |
| 47. | Client Project | LyondellBasell
FIS-370: Engineering Study for Capacity Improvement of Vacuum Heater |
| 48. | Client Project | Total
FIS-371: Efficiency Improvement Study of HDS-3 Hydrofiner Charge Heater |
| 49. | Client Project | Phillips 66
FIS-372: Engineering Study for CCU-1 CO Heater |
| 50. | Client Project | Total
FIS-378: Engineering Study for Vacuum Heater |
| 51. | Client Project | Total
FIS-380A: Performance Improvement Study for Crude Heater |

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| 52. Client Project | Total
FIS-380B: Performance Improvement Study for Vacuum Heater |
| 53. Client Project | Lima Refining
FIS-382: Engineering Study for NOx Reduction and Capacity Improvement of Crude & Vacuum Heater |
| 54. Client Project | Citgo
FIS-383: APH Study for Coker Heater |
| 55. Client Project | Phillips 66
FIS-387B: Performance Improvement Study of Coker Heaters |
| 56. Client Project | Phillips 66
FIS-395 A, B, C, & D: Engineering Studies of Crude Heater, Vacuum Heater, Steam reformer, and FCC Heater in Crude Service |
| 57. Client Project | Total
FIS-396: Engineering Study of Air Preheating System of Crude Heaters |
| 58. Client Project | Husky
FIS-400: Engineering Study of Hydrocracker Stabilizer Reboiler |
| 59. Client Project | Phillips 66
FIS-401: Engineering Study of DHT Charge Heater |
| 60. Client Project | Phillips 66
FIS-402: Engineering Study of Atmospheric Charge Heater |
| 61. Client Project | Citgo
FIS-404: Engineering Study of Unicracker Heaters: Recycle Hydrogen Gas Heater and Recycle Oil Heater |
| 62. Client Project | Flint Hills
FIS-406: Engineering Study of DHT-1 Charge Heater |

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|--------------------|---|
| 63. Client Project | Qatar Gas
FIS-407: Engineering Study for Condensate Heater, Charge Heater, Reactor Feed Heater, Stripper Reboiler |
| 64. Client Project | Frontier
FIS-410: Coker Charge Heater Study |
| 65. Client Project | Alon USA
FIS-411: Engineering study of C-8 Reboiler Heaters |
| 66. Client Project | Alon USA
FIS-413: Catalytic Feed Preheater Evaluation |
| 67. Client Project | Total
FIS-414C: Engineering Study of Reactor Charge Heater to Reduce Number of Burners |
| 68. Client Project | Plain Gas
FIS-416: Performance Study of Train 2 Hot Oil Heater |
| 69. Client Project | LyondellBasell
FIS-417: Engineering Study for Tube Boilers LB-102 A&B |
| 70. Client Project | CountryMark
FIS-419: Capacity Improvement Study of Crude and Vacuum Heaters |
| 71. Client Project | Phillips 66
FIS-420: Engineering Study of DU-2 Crude Heater F-202 /203 |
| 72. Client Project | Mustang/ Ergon WVI
FIS-421: Engineering Study of DU-2 Crude Heater F-202 /203 |
| 73. Client Project | CH2E
FIS-422: Engineering Study for Pyrolysis Heaters |
| 74. Client Project | Qatar Gas
FIS-423: Process Design Package for NOx Reduction Study of Condensate Heater |

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|--------------------|---|
| 75. Client Project | Marathon Petroleum
FIS-424 Engineering Study for NOx Reduction of Hot Oil Heater at Marathon Galveston Bay Refinery |
| 76. Client Project | Phillips 66
FIS-426 FCC Charge Heater H-6 Study |
| 77. Client Project | NARL
FIS-430 Performance Improvement Study of Crude Heater |
| 78. Client Project | Safety Kleen
FIS-431 Hot Oil Heater |
| 79. Client Project | Phillips 66
FIS-432 DU1 Heater O2 Nozzles |
| 80. Client Project | Alon USA
FIS-433 Catalytic Reformer Heater, NOx Reduction Study |
| 81. Client Project | Phillips 66
FIS-436 Performance Improvement Study of Crude Heater |
| 82. Client Project | LyondellBasell
FIS-437 Performance Improvement Study and CFD Modeling Study of Delayed Coker Heaters |
| 83. Client Project | Frontier
FIS-438 Capacity Improvement Study of Unifiner Charge Heater |
| 84. Client Project | Phillips 66
FIS-446 Performance Improvement Study of DU-1 F-301 & F-302 Crude Heaters |
| 85. Client Project | CountryMark
FIS-447 Capacity Improvement Study of FCC Feed Heater |
| 86. Client Project | Phillips 66
FIS-448 Engineering Study of Coker Heaters |

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|--------------------|---|
| 87. Client Project | Marathon Petroleum
FIS-457 Engineering Study of Heaters |
| 88. Client Project | Phillips 66
FIS-458 NOx Reduction & Capacity Improvement Study of CCR Reformer |
| 89. Client Project | Marathon Petroleum
FIS-460 Platforming Heaters Sealing Study |
| 90. Client Project | Marathon Petroleum
FIS-461 Engineering Study of Platformer Heater |
| 91. Client Project | Phillips 66
FIS-470B SCR Design Review of HP-38 Hydrogen Reformer Heater |
| 92. Client Project | Phillips 66
FIS-472 Capacity Improvement Study of Depropanizer Reboiler Heater |
| 93. Client Project | Phillips 66
FIS-478B FEL-3 Engineering Study for NOx Reduction in Boiler #6 |
| 94. Client Project | Phillips 66
FIS-479 FEL-3 Engineering Study for NOx Reduction in FCC Unit |
| 95. Client Project | Phillips 66
FIS-480 FEL-3 Engineering Study for NOx Reduction in Reboiler Heater |
| 96. Client Project | PTT Global Chemical 6 Refinery
FIS-482 Capacity Improvement Study of High Vacuum Unit Furnace |
| 97. Client Project | Marathon Petroleum
FIS-483 Capacity Improvement Study of LPCCR Platformer Heater |

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| 98. Client Project | Phillips 66
FIS-494A/B/C FEL-2 Support Services for NOx Reduction in Boiler #4, Boiler #8 and Rerun Feed Heater |
| 99. Client Project | Phillips 66
FIS-495 Steam System Study for Catalytic Reformer CR-1 in unit heaters |
| 101. Client Project | Phillips 66
FIS-500 Engineering Study of Crude Heaters |
| 102. Client Project | Husky
FIS-501 Heater Rerating / CFD Modeling |